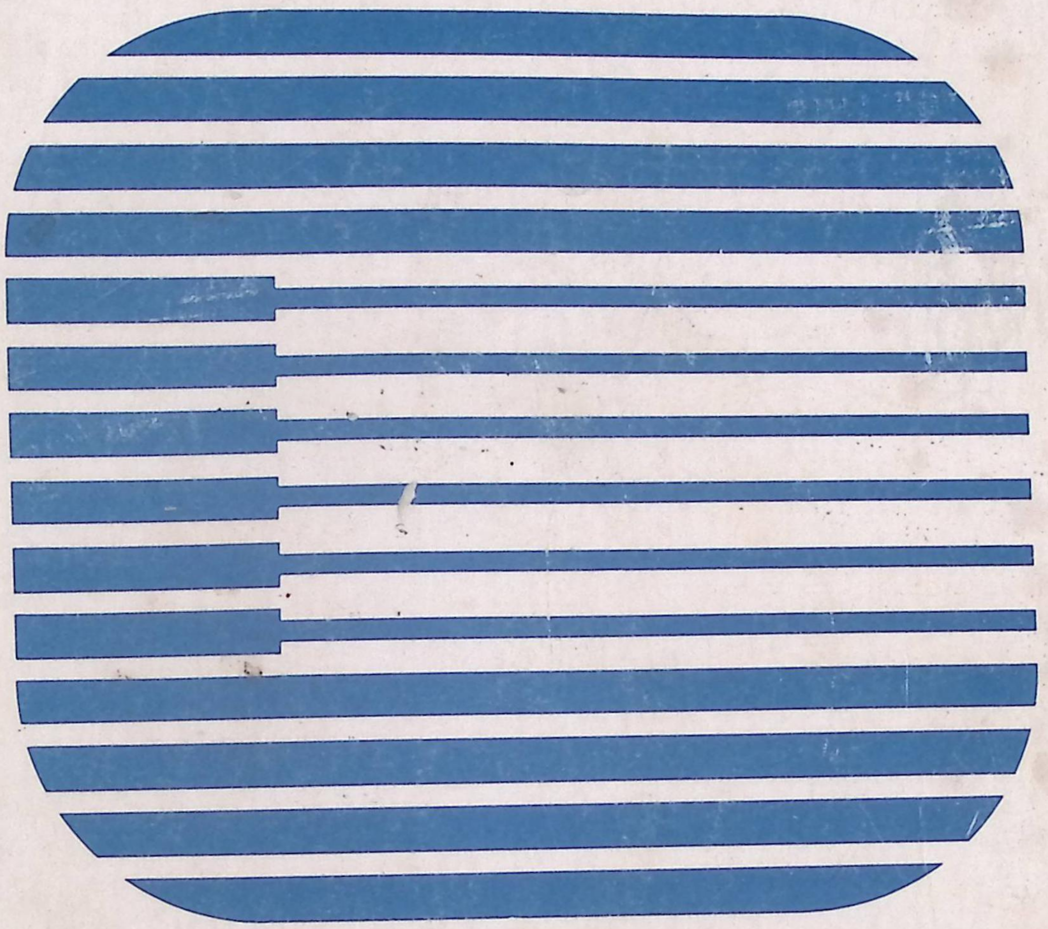
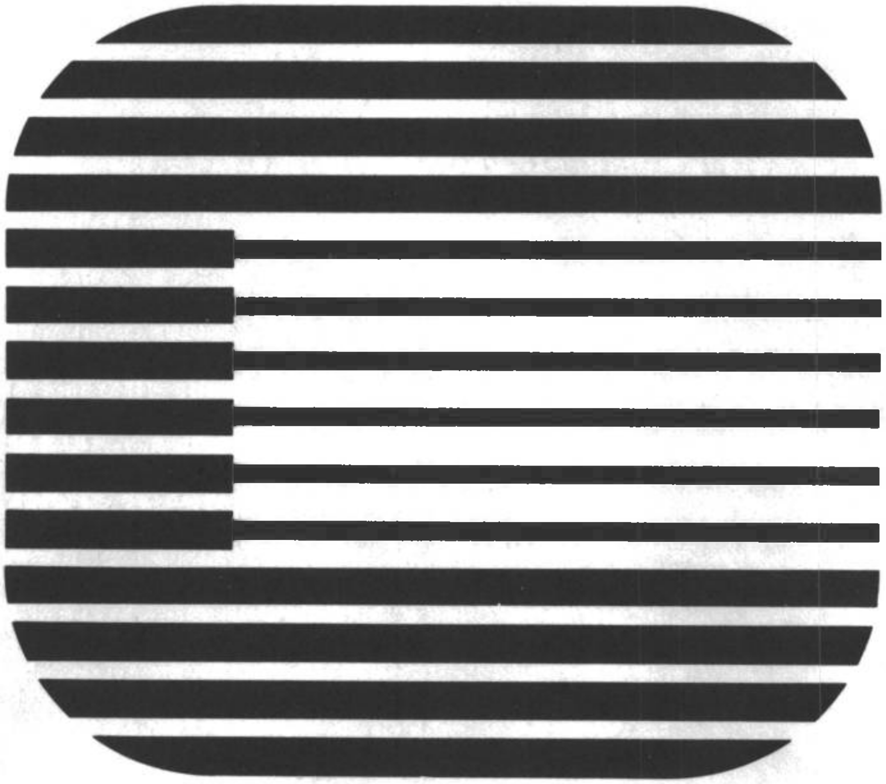


CONRAC

Installation, Operation, and Maintenance Manual

5500 Series
Video Monitors



CONRAC

Installation, Operation, and Maintenance Manual

5500 Series Video Monitors

Covering Models:

5511
5512
5513
5514
5521
5522
5523
5524
5532
5533
5534

-WARNING-

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

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5500 SERIES, RGB
MONITORS

5500 SERIES, NTSC &
PAL MONITORS

SECTION 1

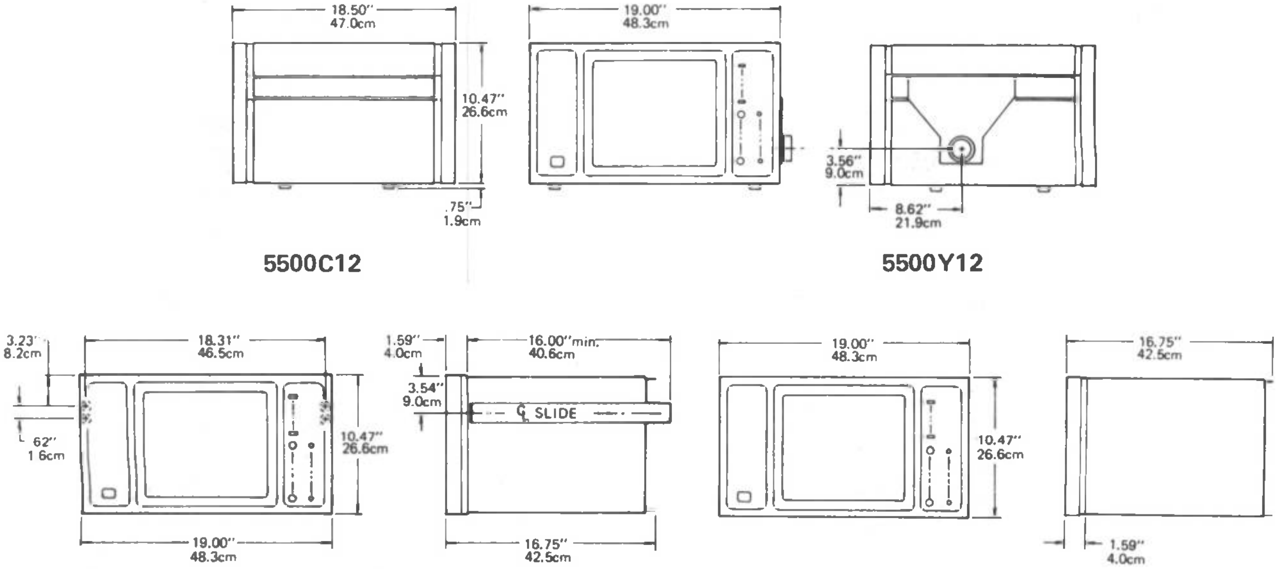
GENERAL DESCRIPTION

The Conrac 5500 series color television monitors are twelve inch, modular, solid state units which offer excellent colorimetry and long-term stability. The 5500 series form a family of monitors operating in the RGB (5511 and 5521), NTSC (5512, 5522, and 5532), PAL-B (5513, 5523, and 5533), PAL-M (5514, 5524, and 5534), SECAM-50 (5515 and 5525), and SECAM-60 (5516 and 5526) color systems. The SECAM models are not covered in this manual.

All 5500 series monitors feature high stability ac-coupled and clamped luminance channels, preset controls for brightness and contrast, and horizontal AFC with switchable time constant. Simplified convergence adjustments are afforded through the use of a single gun Trinitron® cathode-ray tube.

The NTSC and PAL models also have preset controls for chroma level and phase, and continuously variable aperture correction. In addition, the NTSC models have a switchable corrective matrix which permits correction for colorimetry errors introduced by differences between NTSC encoded camera outputs and modern rare earth phosphors.

Mechanically, the 5500 series monitors are constructed of heavy gauge aluminum arranged in a "U" configuration. This permits physical separation of the power supply and deflection circuitry from the video amplifier and decoder circuitry. The circuit boards are interconnected by means of a quick-disconnect wiring harness. Aluminum extrusions running from front-to-back at each side form full-length recessed carrying handles. Easily removable sheet metal covers enable quick access for maintenance.



5500C12

5500Y12

5500RS12

5500N12

Figure 1-2. Outline dimensions

SPECIFICATIONS

VISUAL PERFORMANCE

Linearity and Geometry	Within 2% of raster height.
Convergence	No deviation more than 1.52 mm (0.06 in.) from picture height within a circular area equal in diameter to the picture height. Elsewhere, no deviation more than 1.91 mm (0.075 in.) of picture height.

CRT Phosphor Chromaticity Coordinates

	x	*y*
Red	.645	.335
Green	.275	.600
Blue	.150	.065

Color Temperature	The ranges of the red, blue and green gain adjustments are sufficient to permit setting the white color temperature over a wide range. This unit is factory adjusted to Illuminant D (6500°K) but may be reset to any desired color temperature.
Interlace	Better than 90%.
Raster Size Regulation	Less than 1% change, 0 to 100% average picture level (APL) at 20fL peak luminance.
Black Level Stability	The black level shift is less than 1% of peak luminance in a step function change from 10% to 90% APL.

OPERATING ENVIRONMENT

Temperature	10° to 50° C.
Humidity	10% to 90%, no condensation.
Altitude	To 3,000 meters (10,000 ft.)

INPUT POWER REQUIREMENTS

Voltage	90 - 110 volts ac 108 - 132 volts ac 180 - 220 volts ac 198 - 242 volts ac 216 - 264 volts ac
Frequency	50 - 60 Hz.
Power	100 watts, nominal.
Connection	Captive 6 foot cord with 3-prong connector plug.

SIGNAL INPUTS

Video Input Connectors	The NTSC and PAL units have two loop-through inputs with captive 75Ω terminators. The RGB units have loop-through inputs for each of the three colors (Channel A) and one 75Ω terminated input (Channel B) for monochrome test.

Video Input Signals	*Composite video signal:* 1.0V p-p nominal (0.35V to 2.0V limits), sync negative. (Sync must be composite on the green input channel in RGB units.) *Non-Composite video signal:* 0.7V p-p nominal (0.25V to 2.4V limits).
Return Loss	Better than -40 dB.
External Sync	4V p-p nominal (1V to 8V limits), negative-going.

CIRCUIT PERFORMANCE

Video Amplifier Frequency Response	*NTSC and PAL units:* monochrome signal applied ±1 dB to 5 MHz. *RGB units:* ±1 dB to 10 MHz in each color channel.
Video Amplifier Differential Gain	Less than 5% for luminance range of 0fL to 20fL.
Aperture Correction	Continuously adjustable front panel control provides up to 6 dB boost at 3.2 MHz. *(This feature is not present on RGB units.)*
Vertical Retrace Time	1000 microseconds, maximum.
Low Voltage Regulation	Less than 1% change for line voltage variations of ±10% from nominal.
High Voltage Regulation	Less than 2% change for 0% to 100% APL at 20fL peak luminance.
Decoder Accuracy	Error less than 1.5°. *(Does not apply to RGB units.)*
Chroma Control	Provides continuous adjustment of chroma from 0 to 6 dB above correct matrix. *(Does not apply to RGB units.)*
Phase Control	Provides continuous adjustment of subcarrier phase over the range of ±40°. *(Does not apply to RGB units.)*

MECHANICAL

Weight	18 kg. (40 lbs.) net, 23.4 kg. (52 lbs.) shipping.
Dimensions	See Figure 1-2 for outline dimensions.

NOTE

EACH 5500 SERIES COLOR VIDEO MONITOR IS TESTED, INSPECTED, AND COMPLETELY ADJUSTED PRIOR TO SHIPMENT. IT SHOULD OPERATE PROPERLY WHEN POWER AND INPUT SIGNAL ARE APPLIED. FREQUENTLY, HOWEVER, PARTS OF THE MONITOR BECOME MAGNETIZED DURING SHIPMENT. THIS CAUSES IMPURITY IN THE DISPLAYED COLOR PICTURE AND/OR A CHANGE IN STATIC CONVERGENCE.

PRIOR TO INSTALLING YOUR MONITOR IN A PERMANENT OR FIXED LOCATION, WE RECOMMEND THAT IT BE OPERATED ON A TEST BENCH TO VERIFY PROPER OPERATION AND OPTIMUM PURITY AND CONVERGENCE. FOLLOW THE OPERATING AND DEGAUSSING INSTRUCTIONS OUTLINED IN SECTION 2 OF THIS MANUAL. IF, AFTER A WARMUP PERIOD OF ONE HOUR, POOR PURITY AND/OR CONVERGENCE IS STILL APPARENT, PERFORM THE PURITY AND CONVERGENCE ADJUSTMENT PROCEDURE, STEP-BY-STEP, AS DESCRIBED IN SECTIONS 4.11 AND 4.12 OF THIS MANUAL.

SECTION 2

INSTALLATION AND OPERATING INSTRUCTIONS

INSTALLATION

Unpacking

Unpack the monitor carefully, taking care not to scratch or strike the picture tube face. Do not discard any packing material until all accessories have been located. The following items are packed with each monitor:

1	set tally light symbols
2	keys
1	instruction manual

Rack slide version includes:

1	box of mounting hardware

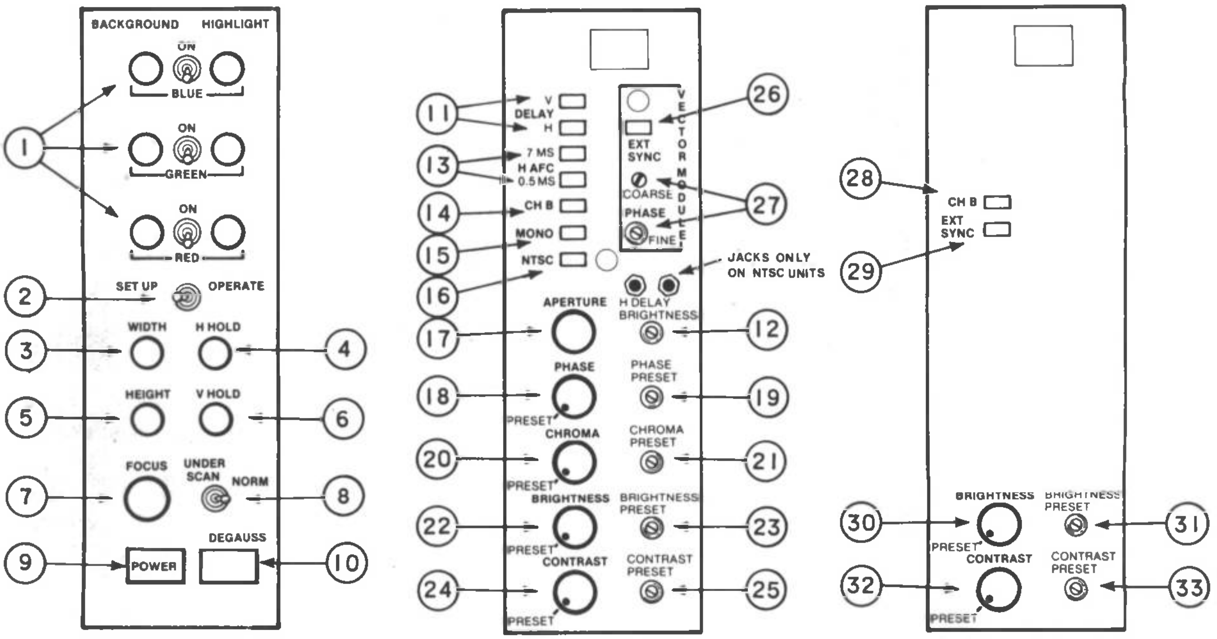
Installation

Unless special arrangements have been made, all monitors are wired for 120V ac nominal input voltage. If it is necessary to change the nominal operating voltage, remove the left side cover to gain access to the power transformer primary wiring panel terminal strip. Connect jumpers as shown on Chart A of Schematic 452605, 452606, or 452607 for the appropriate input voltage. For proper protection, be sure that the circuit breaker is of the correct type and rating for the input voltage used. Refer to Chart A of Schematic 452605, 452606, or 452607.

Install the monitor in its operating position, making sure that all hardware is properly fitted and secured.

Degaussing

To degauss the unit, depress the DEGAUSS switch on the front panel, hold down for five seconds, and then release. The integral moni-



Left Control Panel (door open)

Right Control Panel in NTSC and PAL units

Right Control Panel, in RGB units

Figure 2-1. Operating controls

tor degaussing system degausses the internal shield and picture tube. An external hand-held coil is effective for degaussing external and cabinet parts which may have become strongly magnetized during handling or transportation. External degaussing at the time of installation of the monitor is recommended.

For this initial degaussing, the G.C. Electronics type 9317 degaussing coil is recommended. Connect the degaussing coil to a 120V ac line and hold the coil about one inch away from the front of the picture tube. Move the coil slowly in a circular motion, parallel to the front of the monitor, for a few seconds. Then, slowly back away several feet from the monitor and turn off the degaussing coil.

OPERATING INSTRUCTIONS

Left control panel operating controls
(Refer to Figure 2-1.)

① Background/Highlight controls and Beam switches . . . grouped by primary color, these controls and switches enable each primary color beam (red, green or blue) to be turned on and off and controlled individually to provide for adjustment of their highlight and background intensities.

② Setup/Operate switch . . . used to select normal operation (operate) or to collapse the vertical sweep to form a reference line for adjustment of the background controls (setup).

③ Width control . . . adjusts the horizontal size of the raster.

④ Horizontal hold control . . . adjusts the phasing of the picture with respect to the raster.

⑤ Height control . . . adjusts the vertical size of the raster.

⑥ Vertical hold control . . . adjusts the vertical synchronization.

⑦ Focus control . . . adjusts the sharpness (focus) of the raster scanning lines.

⑧ Underscan/Normal switch . . . enables the selection of either 3% overscan (normal) or 20% underscan (underscan) raster size.

⑨ Off/On switch . . . ac power switch.

⑩ Degauss pushbutton . . . operates the internal degaussing system.

Right control panel operating controls on NTSC and PAL units (Refer to Figure 2-1.)

⑪ V and H Delay pushbutton switches . . . provide vertical (V) and/or horizontal (H) delay, allowing display of the sync and blanking intervals on the screen. In the vertical delay mode, the raster is expanded approximately five times normal. This affords a clear display of the vertical sync interval. In the horizontal delay mode, the picture brightness is enhanced to clearly show the horizontal sync pulse.

⑫ Horizontal delay brightness control . . . sets the level of picture brightness enhancement to clearly show the horizontal sync pulse in the blanking interval.

⑬ Horizontal AFC pushbutton switches . . . control the horizontal AFC time constant. With both buttons out, the time constant is 2 milliseconds. Depressing the appropriate button will select either 0.5 milliseconds or 7 milliseconds.

⑭ CH B pushbutton switch . . . selects the channel B video input. When this switch is out, the *A* channel is selected. When it is depressed, the *B* channel is selected.

⑮ Mono pushbutton switch . . . selects monochrome operation only, when depressed.

⑯ NTSC (or PAL-S) pushbutton switch . . . In NTSC units, this switch is labeled NTSC. When depressed, this switch selects the NTSC phosphor correction matrix. In PAL units, this switch is labeled PAL-S. When depressed, it selects simple PAL operation.

⑰ Aperture control . . . used to adjust the amount of aperture correction. Aperture correction is used to compensate signals with degraded high frequency components by increasing the apparent sharpness of edge transitions.

⑱ Phase control . . . adjusts the chroma phase, thus affecting the hue of the displayed picture. In the preset position, the phase is set by screwdriver adjustment.

⑲ Phase preset . . . screwdriver adjustment which adjusts the chroma phase (hue) when the chroma phase control is in the preset position.

⑳ Chroma control . . . adjusts the amplitude of the chroma signal displayed on the screen. In the preset position, the chroma intensity is set by screwdriver adjustment.

㉑ Chroma preset . . . screwdriver adjustment which adjusts the chroma amplitude when the chroma control is in the preset position.

㉒ Brightness control . . . adjusts the raster brightness. In the preset position, the brightness is set by screwdriver adjustment.

㉓ Brightness preset . . . screwdriver adjustment which adjusts the raster brightness when the brightness control is in the preset position.

㉔ Contrast control . . . adjusts the luminance intensity of the displayed picture. In the preset position, the contrast is set by screwdriver adjustment.

㉕ Contrast preset . . . screwdriver adjustment which adjusts the luminance intensity (contrast) of the displayed picture when the contrast control is in the preset position.

㉖ Vector module external sync pushbutton switch . . . found only in units equipped with the vector output module. This switch selects between an internal chroma reference oscillator signal (pushbutton out) and an externally supplied reference signal (pushbutton in).

㉗ Vector module coarse and fine phase . . . screwdriver adjustment controls, found only in units equipped with the vector output module. These controls are used to rotate the phase of the vector output so that the vectors will be properly positioned on the vector display CRT.

Right control panel operating controls in RGB units (Refer to Figure 4-1.)

㉘ Channel B pushbutton switch . . . selects between RGB 3-color, 3-channel input (pushbutton out) and the channel B test signal monochrome input (pushbutton depressed).

㉙ External sync pushbutton switch . . . selects between internally supplied sync (pushbutton out), for composite video operation, and external sync (pushbutton depressed), for non-composite video operation. In composite video operation, the sync signals must be present in the green channel.

㉚ Brightness control . . . adjusts the raster brightness. In the preset position, the brightness is set by screwdriver adjustment.

㉛ Brightness preset . . . screwdriver adjustment which adjusts the raster brightness when the brightness control is in the preset position.

㉜ Contrast control . . . adjusts the luminance intensity of the displayed picture. In the preset position, the contrast is set by screwdriver adjustment.

㉝ Contrast preset . . . screwdriver adjustment which adjusts the luminance intensity (contrast) of the displayed picture when the contrast control is in the preset position.

Initial Operation

1. Place the three gun switches ① in the up (on) position. Place the setup/operate switch ② in the operate position. Place all pushbutton switches in the out (button not depressed) position. Adjust all controls to their preset or mid-positions.

2. Connect the ac line cord to a suitable ac receptacle. Connect a source of video information to the channel A video input and terminate appropriately. (On RGB units only, connect the video signal to the channel B input and depress the channel B pushbutton switch ㉘ . This input is internally terminated in 75 ohms.)

3. Turn the power switch ⑨ on and allow a minimum of 20 minutes warmup time before making any adjustments.

4. Degauss the monitor thoroughly by depressing the degauss button ⑩ and holding it for five seconds. The integral degaussing system degausses the internal shield and the picture tube.

5. Adjust the contrast to zero and brightness to produce a bright raster. Check the purity of each color by turning off the gun switches, located on the left control panel, two at a time. Final criteria is observing a white field for minimum shading. If adjustment of the purity is necessary, refer to the next part of this section, "Procedure."

6. Apply a crosshatch test signal to the monitor test input and adjust the contrast and brightness controls to preset. Check for convergence errors. If the purity has been readjusted, it will be necessary to readjust convergence.

7. Apply a ten-step linearity test pattern (gray scale) to the monitor test input and check for white balance and tracking. Each step should have the same color (hue), increasing from black to white. If it is necessary to adjust the gray scale, refer to the "Procedure" section under PRELIMINARY ADJUSTMENTS.

8. Apply an Indian Head, or similar high white duty test pattern to the monitor test input. Adjust the brightness control from minimum to maximum and observe the screen background brightness change. The brightness control is correctly adjusted when the contrast is at zero and the picture tube is just at cutoff. Near the maximum end of control, the control may seem to have no effect. This is due to the ABL (Automatic Brightness Limiter) action which limits the maximum scene brightness so that the high voltage does not go out of regulation.

9. Adjust the contrast control from minimum to maximum and observe the scene contrast change.

10. On the left control panel, place the underscan switch to underscan. The display size should decrease to show the four corners of the raster. Adjust the brightness control so that the raster is visible at the edges of video. Adjust the horizontal hold control to center the video on the raster. Place the underscan switch to normal.

11. Turn the vertical hold control fully counterclockwise. The picture should roll downward. Adjust the vertical hold clockwise until the video locks in sync and then ¼ turn past the point where the video locks.

12. Place the setup/operate switch to setup. A horizontal bar will appear. This line

can be used for quick adjustment of the background controls by adjusting them to produce a neutral gray bar. Place the set-up/operate switch to *operate.*

13. Adjust the height and width controls (with the underscan switch in normal) so that the video slightly overscans the picture tube (3% overscan).

14. Adjust the focus control for optimum focus.

15. Place the channel select switch to the unused channel. The monitor should go black. Connect an Indian Head, or other test pattern to this channel. In the case of RGB monitors, loop the channel A red, green and blue inputs together. The monitor should display the pattern normally.

Preliminary Adjustments

Certain preliminary adjustments are required prior to operating Conrac 5500 Series Monitors if optimum performance is to be obtained. The procedures described in this section enable setup of the monitor to a consistent operating level. These procedures may be followed for more than one monitor to match white balance, background, highlight levels, and, in the case of NTSC and PAL monitors, chroma and phase.

Required Equipment

Color Bar Generator (not needed for RGB units)
Window Generator
Oscilloscope
Split Field D6500 Comparator
Foot Lambert Meter

Procedure

1. Apply a color bar signal to the monitor. (Use window signal for RGB models.)

2. Place the vertical delay switch ⑪ in the delay (in) position.

3. Adjust the background brightness with the brightness preset so that the *hammer* (vertical sync) just matches the background in the vertical blanking interval.

4. Place the vertical delay switch ⑪ in the normal (out) operating position.

NOTE: Omit steps 5-10 for RGB units only.

5. Set the green and red gun switches ① to off.

6. Adjust phase ⑲ and chroma ㉑ preset controls for uniform blue bars. Areas occupied by other bars should be uniform black.

7. Place the blue gun switch in the off position and the green gun switch to on. Check the bars for uniformity.

8. Place the green gun switch to off and the red gun switch to on. Check the bars for uniformity. (Note it is more accurate to use an oscilloscope for checking the bars by connecting to the blue, green, and red cathode resistors as you are checking each in turn. However, the normal color vision eye can give a fair comparison of the bar uniformity.)

9. Switch all guns to on.

10. Remove the color bar pattern and apply a window signal to the monitor.

11. Using a split field optical comparator for D6500 aimed at the area around the window, adjust the background controls ① and brightness controls for a D6500 color and brightness match at about 1 to 2 foot Lamberts.

12. Re-position the comparator on the window and adjust it for highlight check (approximately 15 to 20 foot Lamberts).

13. Recheck and adjust the background and

highlight controls until you are satisfied with the match to the comparator standard.

14. Return the brightness control to the preset position. Turn on the vertical delay switch and check the *hammer* and background for black level match. Adjust the brightness preset if necessary. Move the vertical delay switch to the normal (out) operating position.
15. Using a foot Lambert meter, set the contrast control to give the desired highlight brightness.
16. Remove the window signal and apply the signal to be monitored.

SECTION 3

CIRCUIT DESCRIPTION

All 5500 series color video monitors are designed around a 12 inch Trinitron®type CRT. Different models in the 5500 series will operate using the NTSC, PAL-B, PAL-M, SECAM 60, and SECAM 50 color modulation systems. Models are also available for RGB (Red Green Blue) three-channel unmodulated color operation. This circuit description covers all models in the 5500 series except those using the SECAM color system. A tabulation of the models covered by this circuit description is given in Table 3-1.

Model	Type	Description
5511	RGB	Pulse Cross Optional
5512	NTSC	Pulse Cross Optional
5513	PAL-B	Pulse Cross Optional
5514	PAL-M	Pulse Cross Optional
5521	RGB	Pulse Cross Standard
5522	NTSC	Pulse Cross Standard
5523	PAL-B	Pulse Cross Standard
5524	PAL-M	Pulse Cross Standard
5532	NTSC	Pulse Cross Standard, with vector output module
5533	PAL-B	Pulse Cross Standard, with vector output module
5534	PAL-M	Pulse Cross Standard, with vector output module

Table 3-1

This circuit description is divided into three parts. Part I covers the circuitry common to all models in the 5500 series. Part II covers signal processing in the NTSC and PAL models. Part III covers signal processing in the RGB models. Disregard part II entirely if your monitor is an RGB model. Similarly, disregard part III entirely if you have an NTSC or PAL model.

I. Circuits Common To All 5500 Series Models

The circuitry common to all 5500 series monitors includes the scan board, which contains the vertical and horizontal deflection circuits as well as the power supply regulators, the pulse cross board, the high voltage module, and circuitry associated with the CRT. Chassis wired circuitry is also common.

Low Voltage Power Supplies

All dc power supplies (except +100V) are electronically regulated and are referenced to the +24 volt supply, which is the principal supply. In this way, all changes in supply conditions are uniform and tend to cancel each other. The 5500 series monitors use the +24 volt supply for all low level signal processing and control. They also use a +100 volt supply for horizontal deflection and high voltage generation and a 200 volt supply for video amplifier V_{cc}. The rectifiers for the low voltage power supplies are encapsulated bridge types, located at the rear of the left chassis. The filter capacitors are located on the left chassis, below the scan board (162572). The regulator circuits are located on the scan board.

+24 Volt Power Supply

The +24 volt power supply is regulated by integrated circuit Z1. Unregulated dc is applied to pins 11 and 12 of Z1 through R99 and to the collector of external pass transistor Q5. Integrated circuit Z1 functions as a comparator which compares a sample of the regulated output voltage (through ladder divider R73, R74 and R75) to an internal reference voltage. The output of the comparator biases the driver stage which drives the external pass transistor Q5. Current protection is provided by R72 in series with the output. When the drop across R72 exceeds 0.6 volts, the internal protection transistor begins to conduct and pulls the output voltage down. This limits the maximum output current to about two amperes. The +24 volt regulator circuit is located in the lower left corner of the scan board (162572). Q5 is located on the left chassis member below the scan board.

+100 Volt Power Supply

The +100 volt power supply is not regulated at this point. It is supplied to the horizontal output regulator (width control) and high voltage regulator as filtered, but unregulated, dc. These regulators are discussed in detail in the section covering the horizontal sweep and high voltage circuits.

+200 Volt Power Supply

Unregulated dc is supplied to +200V pass transistor, Q3, and the regulator circuit consisting of Q23 and Q13. A sample of this output voltage, through R70, R71, and Q13, is compared to the +24V reference at Q12. The Q12 collector current through divider R66, R65 and R100 establishes the bias on pass transistor Q3. Overload and arc protection are provided by R116 and diode CR16. The +200V regulator circuit is located with the +24V regulator circuit on the lower left corner of the scan board 162572 and the pass transistor, Q3, is next to the +24V pass transistor.

High Voltage Power Supplies

The high voltage power generating equipment is of the pulse and flyback type. This produces a +500V power supply for G2 (screen grid) bias, a +800V power supply for focus anode bias, a 19.5 kV power supply for CRT final anode B+, and a 19.0 kV supply for electrostatic convergence. The high voltage generating equipment is contained in module 106363 mounted on the inside of the left chassis member.

+19.5 kV Power Supply

The high voltage switch transistor, Q1, turns on during line scanning time and current builds in the high voltage flyback transformer, T1. During retrace time, the transistor switches off and a positive pulse of about 800 volts appears at its collector. This is boosted by transformer action to a pulse of about 5000 volts which appears across the secondary of T1. This is fed to a voltage quadrupler assembly to obtain 19.5 kV. A sample of this output is returned to the regulator via high voltage bleeder 844105, R16, and the +24V reference. +100V is supplied to the comparator (Q3) collector through divider R8, R11, and R12. The Q3 collector current establishes bias on driver stage Q2 which in turn biases the pass transistor Q2. This process controls the B+ for high voltage switching transistor Q2 and thereby controls the high voltage output. +19.5 kV is supplied to the CRT final anode.

The +800V collector pulse is peak rectified and filtered by CR2 and C3. Approximately 800 volts dc is available at pin 22 of board 162573. This is divided in the focus control to the proper voltage and delivered to the focus anode of the CRT.

+500V Power Supply

The +800V Q1 collector pulse is rectified and filtered by CR2, C3, and regulated to +500V by Q6, Q1 and the two zener diodes. CR5 and CR6. The output of the regulator at pin 18 is used to drive the CRT screen grid (G2) via the G2 bias control on the high voltage divider board 162601.

+19.0 kV Electrostatic Convergence Power Supply

The +19.5 kV final anode supply is divided through an adjustable bleeder assembly made up of part of bleeder 844105 and the resistor ladder on the high voltage divider board 162601. The CRT requires a power supply

511 V (±5%) less than the final anode voltage. Adjustment of this supply voltage is provided by a shorting plug for coarse adjustment and a pot, R11, for fine control. The ABL circuit is discussed with the luminance channel of the video processor.

Horizontal Scan

The horizontal scan system is composed of the horizontal AFC circuit, the horizontal oscillator, horizontal driver stage, horizontal output regulator, horizontal output switch and flyback, and centering control. Horizontal scan circuitry is contained on the scan board, 162572, except the horizontal output switching transistor which is on the chassis below the scan board.

Horizontal AFC Circuit

Horizontal sync pulses are applied to the base of AFC switching transistor, Q6, which produces pulses of equal amplitude and opposite polarity available at its collector and emitter. These pulses turn on the AFC sample diodes CR5 and CR6 during horizontal sync time and allow the sample of the horizontal trace ramp (integrated from a flyback pulse by R40, C17, R111, and C18) that corresponds to sync time to be conducted to the AFC matrix R37 and R38. The ramp is offset by adding dc from the horizontal hold control to the switching point.

Horizontal Oscillator

The output of the AFC matrix is integrated by C20 into a sawtooth current. This sawtooth is further filtered by the AFC time constant network and applied to the base of Q7. Q7 and Q8 form a voltage controlled multivibrator and generate a squarewave having a 50% duty cycle. This oscillator is designed so that it will sync at either the EIA or CCIR line rate.

Horizontal Driver Stage

The squarewave produced by the horizontal oscillator is current amplified by Q9 and Q10 and operates the driver switching transistor. The current through the driver switching transistor, Q11, is coupled through the driver transformer T2 and operates the horizontal scan switch and the high voltage switch transistors.

Horizontal Output Regulator

The collector B+ supply for the horizontal scan switching transistor is obtained from the horizontal output regulator. Unregulated dc is applied to the horizontal output regulator and pass transistor Q4 through R85. A sample of the output is sensed through divider R92, R88, R97, and the width control and compared in Q17 to the reference at the emitter of Q18. The vertical current at the return end of the vertical deflection yoke is integrated into a parabolic waveform. A portion of this parabolic waveform (adjustable by R94, the side pincushion control) is added to the +24V supply in Q18 to produce the reference. In this way, the output of the regulator (i.e., the raster width) is modulated over the field period to achieve side pincushion correction.

Horizontal Output

The horizontal scan current from the collector of the horizontal switching transistor flows through the horizontal windings of the yoke, through the linearity correction inductor, and is returned to ground through C34. A small portion of this current also flows through the flyback transformer.

Horizontal Centering Control

Horizontal centering correction is achieved by rectifying some of the current induced in the secondary of the flyback transformer into positive and negative currents through CR8 and C30, and CR10 and C29. These currents are then added to the yoke current in R61. This induces a static dc current flow in the horizontal windings of the yoke to move the beam left or right.

Vertical Deflection

The vertical deflection circuit consists of a unijunction oscillator, a current amplifier, and a class "A" output stage. The vertical deflection circuit is located on the scan board.

The Vertical Oscillator

A ramp voltage is developed across C5/C6 as the series combination charges through R6 and R7. The vertical sync pulse is amplified and integrated in Q1 and applied to base 2 of unijunction Q2. The unijunction fires on the leading edge of sync (start of retrace) and discharges C5/C6. The result is a sawtooth which is applied to buffer Q3. Positive feedback from the emitter of Q3 through R9 and R10 provides a square law correction voltage for linearity compensation. The vertical oscillator is designed so that it will sync at either the EIA or CCIR field rate.

The Current Amplifier and Output Stage

The sawtooth from the emitter of Q3 is applied through the height control to the base of current amplifier Q4. The emitter of Q4 drives the output amplifier Q1 (on chassis). The sawtooth current through the load inductor, T2, drives the deflection yoke and is returned through the vertical centering control (R22).

CRT Display (Small Screen - Trinitron ®)

The CRT elements each require a source of power in order to cause the CRT to display. The elements are the filaments, the cathodes, the control grid (G1), the screen grid (G2), the focus anode, the convergence anode, and the final anode.

Filaments

The filaments are supplied with ac direct from the power transformer. Filament power is 6.3V at approximately 1 amp. The supply voltage is produced by two 6.3V, 0.5 amp windings on the transformer connected in parallel.

The Cathodes

The video signal from the clamped output amplifiers is fed to the cathodes of the CRT. This video signal contains the proper voltages for operational biasing. Arc protection is afforded by the 1000 ohm series resistors and spark gap capacitors mounted at the neck socket of the CRT.

The Control Grid (G1)

The control grid is driven from the G1 supply source. When cathode blanking is used (RGB model), the G1 is bypassed by a 0.1μF capacitor. The average control grid voltage is 65 V dc. When grid blanking is used (NTSC and PAL models), a 24 volt ac pulse superimposed on the G1 bias drives the tube into cutoff during blanking time.

The Screen Grid (G2)

The screen grid is supplied from the +500V supply, in the high voltage module, through the G2 bias control on board 162601. Nominal G2 voltage is 350 volts dc. Arc protection and bypassing is provided by a 100k resistor and a 0.1μF spark gap capacitor.

The Focus Anode

The focus anode is supplied from the +800V supply in the high voltage module through the front panel focus control.

Electrostatic Convergence Anode

The electrostatic convergence anode is supplied from the +19.0 kV power supply in the high voltage module. Connection is made by a spring contact held in place by a large rubber boot which wraps around the CRT neck and clamps at the bottom. Care must be taken to ensure that the spring fits properly into the connector on the neck and that the spring does not become bent or stretched out of shape.

The Final Anode

The final anode is supplied from the +19.5 kV power supply from the high voltage module.

II. Signal Processing in NTSC and PAL Models

Video Input and Sync Selection and Processing

All 5500 series NTSC and PAL color monitors have a front panel switch (right control panel) for selection of one of two input channels. Internal or external sync sources are also switchable. This is accomplished using buffer amplifiers and diode gates. The video input selection and sync processing circuitry is contained on board 162654 (162575 on early production units) located at the rear of the right chassis member.

Video Input Connectors

Two channels of video input are provided with looped-through BNC connectors. Each can either be terminated in 75 ohms or high impedance. Termination and other impedances have been matched so that a video transmission line will see no reflections from the monitor which could degrade the signal quality.

Video Input Buffers and Diode Gates

Video signals are coupled through the connectors into the monitor to the buffer amplifier (Q1 and Q3 in Channel A; Q2 and Q4 in channel B). Each buffer amplifier is a two-stage emitter follower circuit which provides an input to output buffering of approximately 90 dB. The output of the buffers is coupled to diodes CR2/CR4 and CR3/CR5. When Channel A is selected by the front panel switch, current is supplied through the switch, forward biasing CR3. This in turn reverse biases CR5, keeping it from conducting. At the same time, CR2 is turned off because there is no positive source at its anode. This allows CR4 to be forward biased and conduct video from the emitter of Q3 to the base of driver Q5. The reverse occurs when Channel B is selected.

Sync Selector and Sync Processing

The output of video driver, Q5, drives the contrast control and video processing circuitry via diode gate CR6/CR7/CR8 and CR9/CR10. The sync input buffer Q6 and this diode gate work much the same as the video diode gates described above. The selected sync source is coupled to the sync input amplifier (at this point, sync is negative going) where it is inverted and amplified. The gain of this stage is adjustable by R36. The signal is buffered by Q8 and coupled through the noise filter, C15, C16 and R39, to the saturable switch Q9. A complex coupling filter is required for best response because vertical and horizontal sync pulses are not of the same duration and sometimes high frequency noise is present on the tips of these pulses. The values for C15, C16 and R39 have been carefully selected for optimum response to EIA standard sync pulses. Q9 is biased so it only conducts during the sync interval when it saturates, providing a 15 volt negative going output. Emitter follower Q10 provides isolation and a high current source to drive the horizontal AFC circuit in the horizontal deflection system. Composite sync pulses are also coupled to integrator R48 and C21, which separates the vertical sync pulses, and then to Q12 which inverts them. The vertical sync pulses are then used to trigger the vertical oscillator circuit in the vertical deflection system. Composite sync from the emitter of Q10 or inverted composite sync from the collector of Q10 (selected by the back porch/sync tip selection jumper on the board) is differentiated through C17 and applied to saturable switch Q11. The negative going differentiated pulse edge turns off Q11 to produce a 3 microsecond, 15 volt positive pulse at its collector. This pulse is used for keying and clamping in other parts of the video processing circuitry.

Sync Delay (Pulse Cross)

Delaying the horizontal and vertical sync makes it possible to observe the signal blanking intervals on the CRT. Horizontal delay is accomplished by applying the horizontal sync signal through the input conditioning network to pin 5 of Z1A. Z1 is a dual C-MOS one-shot multivibrator. Half of Z1 generates a pulse which starts at the leading edge of the horizontal sync and has a duration determined by the time constant C2, R7, and R8. This is approximately ½ of a horizontal line period. When the H delay switch is in the normal position, nand gate A is high which reverse biases diode CR2 and allows pulses to pass to Z1, pin 12. Nand gate B is held high and Z1B triggers on the leading edge of the pulse from Z1A (same as start of horizontal sync) generating a 4 microsecond pulse which is fed to the horizontal AFC circuit. When the H delay switch is in the delay mode, nand gate A is low, turning on CR2 and sinking the pulses at R10. Nand gate B passes the pulses from Z1, pin 6, to Z1, pin 11. Z1B then triggers on the trailing edge of the pulse from Z1A and generates the same 4 microsecond sync pulse, except now it is delayed. The vertical delay works in much the same way with different time constants.

Contrast Control and Pre-processing Amplifier

The video signal at the emitter of Q5 is coupled through the contrast control, to the pre-processing amplifier Q22 and Q23 on the video processor board 162553. Q22 amplifies and inverts the signal while Q23 provides the impedance transformation needed to drive the following circuitry. For video inhibit during set-up, the bias is raised on Q22 which saturates Q22 and cuts off Q23. The output of the pre-processing amplifier drives the luminance processor and chrominance processor circuitry.

Luminance Channel Processing

The luminance processor separates the luminance component from the composite signal, provides appropriate delay to match the chrominance timing, compensates the signal frequency response, and controls dc black level.

Subcarrier Trap

C62, C63, R132 and L8 form a bridged T network which is tuned to the subcarrier frequency. When the color ID circuit indicates that a color signal is present, trap switching transistor Q24 turns on and the chroma subcarrier frequency band is removed from the composite signal.

Delay Line and Driver

The luminance component from the subcarrier trap is fed to emitter follower Q25, which drives the luminance delay line. The delay line is required to align the luminance signal to the chroma signal which is delayed by the chroma bandpass circuits. The delay time is approximately 800 nanoseconds. The output of the delay line is fed into buffer transistor Q27. Q27 provides isolation and drives the aperture transformer.

Aperture Corrector

Electronic aperture correction is accomplished by adding phase compensated, high frequency components to the edges of sharp signal transitions. This has the effect of enhancing the edges and adding the appearance of more sharpness or detail. The corrector circuit uses the luminance signal slightly in advance of the output by means of a tap on the delay line. This signal is supplied to buffer stage Q26 for isolation, through the aperture control on the front panel to a differentiator and then to the base of Q28. Q28 drives the primary of the aperture transformer which adds the correction signal to the delayed luminance signal from Q27. The sum output is then coupled into the response compensation amplifier.

Response Compensation Amplifier

The video output amplifiers used in this monitor have an inherent high frequency rolloff which requires compensation. Therefore, the luminance and chrominance signals are independently corrected for frequency response. This method has the advantage that each component can be corrected for its optimum response characteristics. Transistors Q29 and Q30 form a feedback pair amplifier with emitter peaking networks R148/C70 and R153/C72.

Black Level Control

The luminance signal is ac coupled into the black level control circuitry. Here it is clamped to a dc reference level (+8 volts) during the back porch interval by keyed clamp transistor Q31. During the back porch interval, a positive pulse from the video input and sync-clamp generator turns Q31 on and clamps the luminance signal to the reference level. Back porch was chosen as the reference time because it has been defined as having a dc level which is close to signal black level. The clamped signal is coupled to Z5, the brightness pulse inserter. During trace time, Z5 conducts the clamped signal through to buffer Q33. During retrace time, a positive pulse from the pulse generator circuit on the video processor board switches Z5 to the dc level set by the position of the brightness control. The resultant signal at the emitter of Q33 is the delayed and compensated luminance component with the black level clamped to the reference level (+8 volts) and a brightness pulse adjustable from +20% to -10% inserted during horizontal retrace time.

Automatic Beam Current Limiter

A method of limiting the maximum beam current has been provided in this monitor. In the high voltage generator, the return path for the high voltage multiplier is through R20, R19, and R17 to the +24 volt power supply. As beam current increases, the drop across this network increases causing the voltage at its output to become more negative. This voltage is conducted to the ABL driver, Q32. As the ABL voltage becomes negative, Q32 begins to conduct and pulls the dc level from the brightness control toward ground thereby reducing the average beam current. The threshold at which this action begins is adjustable by R17 on the high voltage module.

Output Driver

The processed luminance signal from the emitter of Q33 is fed to the output driver, Q34 and Q35. This is a feedback amplifier capable of driving very low impedance loads. The signal is directed through the output gain controls to the output amplifiers where it is matrixed with the demodulated chroma information and applied to the CRT.

Chrominance Channel Processing

The chrominance processor detects and isolates the chroma information, amplifying and demodulating it into the proper color difference signals to drive the output amplifiers.

PAL Identification (Applies to PAL models only. Disregard this paragraph if your monitor is an NTSC model.)

PAL identification is made on a line-by-line basis by taking advantage of the fact that the alternating V component of burst produces a ½ line (7.5 kHz) component in the APC detector. The differential color APC voltage from IC Z3 on the video processor board (162553) is fed to differential amplifiers Q2 and Q3 on PAL board 162584. Q4 further amplifies the signal and drives tank circuit C5 and L3, which is tuned to approximately 7.5 kHz. The resulting clipped sine wave is fed to the inhibit terminal of the PAL flip flop in IC Z2 on the video processor board, preventing the flip flop from locking up in the wrong phase. Horizontal sync signals from the video input board 162654 (162575 on early models) are fed to Q5, which delivers pulses of the proper level to trigger the PAL flip flop on the video processor board.

Chroma Bandpass Amplifier

The composite video signal from the pre-processing amplifier is coupled into the chroma bandpass circuit L1, L2, C2, C3, C5 and C8. This is a double-tuned LC bandpass filter. Impedance and level transformations are achieved by the ratios of C2/C3 and C5/C8. The mutual (coupling) inductance is the part of L1 from the tap to ground. The resultant frequency response of this circuit is the traditional "double humped" envelope centered about the subcarrier frequency. The output of the bandpass filter is applied to pin 7 of Z1, the chroma amplifier. This is a dc gain-controlled amplifier with a sensitive differential amplifier Schmitt trigger color killer circuit. The gain of the chroma amplifier is dependent upon the dc level at pin 10 of Z1, which is determined by the position of the front panel chroma gain control. For forced monochrome operation, the color/mono switch preselects zero gain in the mono position. The output of the chroma amplifier is available at pin 9 and is coupled through C9 to T1, the chroma bandpass coil. This coil provides the impedance match needed to drive the following circuit. Capacitor C9 and transformer T1 also form a broad (low Q) tuned circuit at subcarrier frequency. The response of the bandpass filter, added to the C9/T1 response, provides a suitable response envelope over the usable chroma band. In order to operate the output stage clamp circuits, it is necessary to ensure that there is no chroma information during the clamp interval. This is accomplished by transistor Q2 in parallel with T1. During the clamp interval, a positive pulse turns Q2 on and swamps T1. In this way, any chroma information which may interfere with the operation of the output clamps is removed prior to demodulation.

Color Detection

A portion of the chroma signal from the bandpass filter is coupled through C27 into the color detector section of Z3. This is a differential amplifier keyed by the back porch pulse at pin 4 through the internal horizontal key switch. This causes the circuit to amplify burst only, if it is present. The amplified burst at pins 15 and 16 is 180^{o} out of phase so that when it is filtered by C4, it becomes a differential voltage proportional to the amplitude of burst. This differential voltage is applied to the differential amplifier of the color killer circuit at pins 1 and 14 of Z1. When the output of the color killer amplifier exceeds a preset level, determined by the adjustment of color killer threshold control R1, a Schmitt trigger turns on the chroma amplifier and allows chroma information to be passed. When this occurs, the voltage at pin 11 of Z1, goes low which turns on the trap switch driver transistor Q1 and the trap switch transistor Q24 in the luminance channel.

U/V Component Separation, PAL (Applies to PAL models only. Disregard this paragraph if your monitor is an NTSC model.)

The chroma signal from T1 on the video processor board is fed to Q1 on the PAL board (162584). Q1 amplifies the signal, driving it through DL1, a 1H glass delay line. DL1 delays the signal for a period equal to exactly one TV line. For this reason, and because of the difference of the location of the chroma passband, the components in this circuit are different depending upon whether the monitor is intended for PAL-B (CCIR line/frame rate) or PAL-M (EIA line/frame rate) operation. The output signals from the delay line at terminals 3 and 4 are equal in amplitude, but opposite in polarity. The non-delayed signal from the emitter of Q1 is fed to the center tap of L2 and adds algebraically to the delayed signals. When the amplitudes are equal (adjusted by R7) and the delay is exactly 1 TV line (adjusted by L1), the V components of the delayed and non-delayed signals add in the V channel and subtract in the U channel. Similarly, the U components add in the U channel and subtract in the V channel. In this way, the U and V components are separated from the composite signal. The U and V components are supplied through relay K1 to the demodulator circuit on the video processor board. When PAL-S (simple PAL) operation is desired, it can be selected by a front panel switch which actuates K1, bypassing the delay line circuit.

Subcarrier Regeneration

The reference subcarrier is regenerated in Z3. This integrated circuit contains a voltage controlled oscillator, a keyed phase detector and feedback/control loop, a keyed chroma detector and control loop, and an output amplifier. The chroma detector and control loop was discussed in the section on color detection. The output amplifier contained in the I.C. is not used because it is keyed during the back porch interval which would prohibit demodulation of burst. The oscillator is a crystal oscillator which is series tuned by C29. A sample of the output of the oscillator is fed back to the keyed phase detector where it is compared against the reference burst in the chroma signal. A control voltage is generated proportional to the phase difference between the burst and oscillator output signals. The control voltage is coupled to the oscillator control input ensuring that there is always a controlled relationship between the phase of both signals. Since the comparison is sampled only during the burst interval, a memory is required to maintain a constant control voltage until the next sample time. This is achieved by C32, R62, R63, and the time constant filter. The output of the oscillator is taken at pin 7 and supplied to Q9 where it is amplified and driven into the subcarrier phase shifter and delay line. C36, CR6, L5, C39, L6, and C43 form a 2 section pi filter. Each section provides about 90° phase delay. The varactor tuning diode, CR6, adjusts the delay of the first section in proportion to the position of the phase control. L5 adjusts the range of the phase control to be centered about the proper decoding angle. L6 is adjusted for proper quadrature angle (90°) at the output of the second section.

Demodulator

Demodulation of the chrominance information occurs in Z2. Z2 contains two synchronous decoders (one for the R-Y channel and one for the B-Y channel) which multiply the appropriate reference subcarrier from the subcarrier regenerator by the chrominance information in each channel. In this way, the vector product (which includes phase and amplitude information) of the two signals appears at the output. This is now the red minus luminance in the R-Y channel and blue minus luminance in the B-Y channel. Due to the nature of the decoders, this signal contains also the second harmonic of the subcarrier. These two color difference signals are then algebraically added in the output matrix in proper amounts to produce the G-Y color difference signal. The three color difference signals are filtered by L3, L7, and L12 to remove the second harmonic components.

Phosphor Correction Matrix, NTSC (Disregard this paragraph if your monitor is a PAL model.)

The color correction matrix board, 162560, provides two mixture ratios for the chrominance information. First is a "straight through" or 1:1 ratio which is obtained by selecting the NTSC position on the front panel matrix switch. This allows the color difference signals to be supplied through R1, R3, and R8, respectively to the output common base amplifiers Q1, Q2, and Q3. Selecting the second or corrective matrix causes the chroma to be supplied through R2, R4, R5, R6, and R7, respectively. The resistors adjust chroma amplitudes and mix small portions of each channel with the other two. The corrected color difference signals are supplied through the C-MOS switch; i.e., Z1 to the output common base amplifiers. The NTSC matrix is selected when Z1 pins 9, 10, and 11 are at +12 volts and the corrected matrix is selected when pins 9, 10, and 11 are at 0 volts.

Clamped Output Amplifiers

Note: The Blue channel output amplifier is described below. Red and Green channels are identical except for part numbers.

Output Amplifier

The corrected color difference signal is applied through C20 to Q4 where it is amplified approximately three times and coupled through the gain control circuit (highlight) on the control panel to the emitter of Q7. The output amplifier is, therefore, serving a dual function as a common emitter amplifier for the color difference information and as a common base amplifier for the Y component information. In this way, the Y component is added back to the color difference (B-Y) signal.

Feedback Clamp

The dc level of the luminance channel establishes the emitter bias of Q7. A sample of the output is taken from R35/R36 through the sample switch Z4A (which samples only at the same time as the brightness reference level) to the base of Q5. Q5 and Q17 form a differential amplifier with Q17 referenced to zener diode CR7. The output of the differential amplifier at the collector of Q5 establishes the bias at Q4, which in turn biases Q6 providing the base bias for Q7. In this way, the output dc level at brightness reference time can be controlled and held constant. Since the open loop gain of this system is very high, the large amount of feedback in the system eliminates black level drift.

Adjusting the brightness control will move the video signal about the brightness reference level and thereby control the CRT brightness.

Pulse Formation and Distribution

On the scan board 162572, the vertical sawtooth is differentiated and clipped in C12, R29, and CR4 to provide a positive pulse at vertical retrace time. This pulse is inverted in Q5 and added at the collector to the horizontal retrace pulse derived by clipping the flyback pulse with CR3 and R24. The composite blanking is available at pin 13 and is a 5V negative-going waveform. This signal is ac coupled to Q15 on the video processor board 162553. Q15 is a saturable switch transistor which amplifies, shapes, and inverts the composite blanking. The C-MOS type integrated circuits, Z3 and Z4, require trigger pulses referenced to their power supply (V_{DD}) for proper switching. Diodes CR4 and CR5 clamp the pulses to +12.6 volts peak while CR3 and CR5 determine the V_{DD} for Z2 and Z4. Supply voltages for the matrix board 162560 are also determined from this reference.

Blanking and G1 Bias

The positive pulses from Q15 are coupled to Q16 where they are again inverted. The negative pulses from Q16 are ac coupled and clamped to the G1 bias driver R44, R104, and R105 by diode CR2. This produces a 24 volt negative-going pulse, superimposed on about 65 volts dc for the control grid bias and blanking.

III. Video Input and Sync Selection and Processing In RGB Models Only

Video Input Connectors

There are nine BNC type input connectors on the RGB models (5511 and 5521) in the 5500 series. Two each, connected in a loop-through configuration, are provided for each of the three (red, green and blue) colors. These connectors are not terminated, permitting 'end of line' termination by the system user. A single connector, labeled "Test Channel B", addresses all three colors simultaneously. This connector is terminated in 75 ohms. Two additional parallel-tied connectors are provided for external sync input to the monitor when required. The external sync connectors are unterminated.

Video Input Buffers and Diode Gates

There are two input buffer amplifiers for each of the three colors. Each of these six buffer amplifiers is identical, and consists of a two-stage emitter follower circuit. The Channel A input of each of the three colors is tied to the appropriate loop-through input for that color. The three Channel B inputs are parallel-tied and commonly driven from the "Test Channel B" input connector. The two-stage emitter follower buffer amplifiers provide input-to-output isolation on the order of 90 dB.

The output of the red Channel A buffer is supplied to the common cathode node where diodes CR5 and CR6 join. The outputs of the A and B channel buffers in each of the other two color channels are similarly supplied to diodes CR8-CR9, CR11-CR12, CR14-CR15, and CR17-CR18, respectively.

When Channel A is selected by the front panel "Channel Select" switch, current supplied through R28 and the switch forward biases diode CR6. This reverse biases CR5, so signals from the emitter of Q4 cannot pass through to the red output. At this same time, CR2 is reverse biased, allowing CR3 to conduct. Signals from the emitter of Q2 pass through CR3 to the red output. This description of the red channel applies as well to the other two colors, which are switched simultaneously with the red.

Sync Input Buffers and Diode Gate

The two sync channels each also have emitter follower buffer inputs. These are Q13 and Q14, whose outputs are also coupled through a diode selection gate circuit. The output of the green channel drives the internal sync buffer, Q13. The external sync input is supplied to the base of Q14. Internal or external sync operation is selected by the "Sync Switch" and the CR20-CR23 diode gate circuit in exactly the same manner as described above for the video switching.

Sync Processor

The selected sync source is coupled to the sync amplifier (at this point sync is negative-going) where it is inverted and amplified. The gain of this stage is adjustable by means of sync gain pot R48. The signal is buffered by Q16 and coupled through a noise filter consisting of C17, C18 and R53, to saturable switch Q17. The fact that vertical and horizontal sync pulses are not of the same duration and that there is very likely some form of high frequency noise on the tips of these pulses requires a somewhat complex coupling filter for best response. The values for C17, C18 and R53 have been carefully selected for optimum response to sync pulses of EIA standard timing and duration. Q17 is biased so it only conducts during the sync interval, when it saturates providing a 15 volt negative going output. Emitter follower Q18 provides isolation and a stiff current source to drive the horizontal AFC circuit in the horizontal deflection system. Composite sync pulses are also coupled to saturable switch Q20, through integrator R61/C21, which separates the vertical sync pulses from the composite sync pulses. These vertical sync pulses are used to trigger the vertical oscillator in the vertical deflection system. Composite sync from the emitter of Q18, or inverted composite sync from the collector of Q18 (selected by the back porch sync tip selection jumper on the board), is differentiated through C19 and applied to saturable switch Q19. The negative-going differentiated pulse turns off Q19 to produce a 3 microsecond 15 volt positive-going pulse at its collector. This pulse is used for keying and clamping in other parts of the video processing circuitry.

Sync Delay (Pulse Cross Board)

Delaying the horizontal and vertical sync makes it possible to observe the signal blanking intervals on the CRT. Horizontal delay is accomplished by applying the horizontal sync signal through the input conditioning network to pin 5 of Z1A. Z1 is a dual C-MOS one-shot multivibrator. The first half of Z1 generates a pulse which starts at the leading edge of horizontal sync and whose duration is determined by the time constant C2, R7, and R8. This is approximately ½ of a horizontal line period. When the H delay switch is in the normal position, nand gate A is high which reverse biases diode CR2 and allows pulses to pass to Z1, pin 12. Nand gate B is held high and Z1 B triggers on the leading edge of the pulse from Z1A (same as the start of horizontal sync) and generates a pulse 4 μsec long which is fed to the horizontal AFC circuit. When the H delay switch is in the delay mode, nand gate A is low, turning on CR2 and sinking the pulses at R10. Nand gate B passes the pulses from Z1 pin 7 to Z1 pin 11. Z1 B then triggers on the trailing edge of the pulse from Z1A and generates the same 4 μsec sync pulse except now it is delayed. The vertical delay works in much the same way except that the time constants are different.

RGB Video Processor

The RGB video processor is responsible for simultaneous gain control, response compensation, dc restoration, amplification and retrace blanking. These functions are accomplished on the RGB video amplifier board 162696 (162627 or 162577 in earlier units) located on the right chassis member.

Tracking Contrast Amplifier

The contrast amplifier is three dc gain-control amplifiers made to track or match gain to each other within 1%. The three amplifiers function in the same manner so only the red channel will be discussed. The video signal is coupled through C1 to the constant current source transistor in Z1 at pin 2. This modulates the current available to the two emitters of the differential pair in Z1. A fixed bias of +12V is applied to the base of one of the differential transistors at pin 10. The relative bias levels control the current division between the two differential transistors. The second differential amplifier operates in much the same way except that the constant current source is driven from a dc level. The current division is such that the current through the 1 k load resistor at pin 11 of the first differential amplifier is held constant.

The three tracking controls R15 (R17 on board 162577), R52 (R54), and R89 (R101) provide a means for matching this load current among the three channels. This will control the rate of change of the gain and ensure that the absolute gain of any stage is the same as the other two stages. This method is accurate to within 1%.

Response Compensation

The output of the tracking contrast amplifier is coupled to an emitter follower (Q1, Q7, Q13)/(Q1, Q8, Q17 in board 162577) for isolation. This drives this peaking amplifier (Q2, Q8, Q14)/(Q2, Q9, Q18 in board 162577) a common emitter amplifier with emitter bypass components selected for a frequency response to complement the inherent rolloff in the output amplifier.

Black Level Clamp

The signal from the collector of the peaking amplifier is coupled through a buffer (Q3, Q9, Q15)/(Q3, Q10, Q19 in board 162577) to the black level clamp. The signal is ac coupled to the collector of the clamp transistor (Q6, Q12, Q18)/(Q4, Q11, Q20 in board 162577). During back porch time, a pulse from the clamp pulse generator on the input board saturates the clamp transistor and charges the memory capacitor (C11, C25, C39)/(C12, C28, C46 in board 162577) to the reference voltage at the emitter of the clamp transistor.

Blanking and Brightness Control

On the scan board (162572), the vertical sawtooth is differentiated and clipped in C12, R29, CR4 to provide a positive pulse at vertical retrace time. This pulse is inverted in Q5 and added at the collector to the horizontal retrace pulse derived by clipping the flyback pulse with CR3, R24. The composite blanking is taken off the scan board at pin 13 and applied to the video amplifier board 162696 (162627 or 162577 in earlier units) at pin 25. Q20 (Q14 in board 162577) is normally held on by biasing resistor R114 (R78 in board 162577) and the negative blanking pulses turn Q20 (Q14 in board 162577) off. A positive pulse is then available at the collector of Q20 (Q14 in board 162577). The brightness control adjusts the dc bias on the feedback amplifier pair Q21 (Q15 in board 162577), Q22 (Q16 in board 162577). The resulting output at pin 21 is a positive blanking pulse with an adjustable base level.

Output Amplifiers

The clamped video is fed through a buffer stage (Q4, Q10, Q16)/(Q5, Q10, Q21 in board 162577) to the base of the output amplifier transistor. On board 162696 the buffer stages are complementary (Q4/Q24, Q10/Q25, Q16/Q26). The blanking and brightness level is coupled through the gain controls on the front panel to the emitter of the output transistor. The amplified video with blanking added is coupled from the collector of the output transistor to the corresponding cathode of the CRT.

Set-Up Switch

When the front panel set-up switch is operated, transistor Q19 (Q7 in board 162577) saturates which forward biases diodes CR1, CR2, CR3 and turns off the video at the peaking amplifier stage.

SECTION 4

ALIGNMENT PROCEDURE FOR NTSC & PAL MONITORS

4.1. Test and Measurement Equipment Required

a. Multimeter (VOM), 20,000 ohms/volt (minimum) with ±3% of full-scale accuracy or better. A Simpson, model 260 or Triplett model 630 is recommended.

b. A suitable, matching high voltage probe for use with the above meter. The probe should be suitable for use up to 50 kilovolts.

c. A variable autotransformer for use between the ac power line (mains) and the monitor. The unit must be capable of continuous adjustment of the line voltage from 20% below to 20% above the nominal voltage. A 1000 watt unit is recommended.

d. Oscilloscope. The minimum requirements for the oscilloscope are 15 MHz vertical bandwidth, dual trace, triggered sweep and 0.05 volts/division vertical sensitivity.

e. Matching low capacitance probes for the above oscilloscope having 10X and 100X attenuation, and a direct (1X) probe.

f. Split Field Color Comparator, Fritz Hellige and Co., catalog no. 1072501 or equivalent.

g. Manual degaussing coil, G.C. Electronics type 9317 or equivalent.

h. Footlambert meter, Tektronix type J16 or equivalent.

4.2. Signals Required

a. Indian head or similar high white duty test signal.

b. Sin^2 2T pulse and bar test signal.

c. Standard NTSC (or PAL) color bar signal (full field preferred).

d. 10 MHz composite sweep, if available (not absolutely necessary).

NOTE: All of the above signals (except the 10 MHz sweep) can be obtained from a Tektronix model 149 NTSC signal generator (for NTSC monitors only).

An alternative to the model 149 is to use both the models 140 and 147 together (for NTSC monitors only). For PAL-B monitors, the Tektronix models 141 and 148 signal generators must be used together. For PAL-M monitors, the Tektronix models 142 and 148-M generators must be used. If no Indian head pattern is available, the *Composite* test signal from the Tektronix generator may be used as a substitute.

4.3. Parts Required

a. VMC magnets.

b. HMC magnets.

c. Permalloy shunts.

(NOTE: The above parts are required only when the CRT has been replaced.)

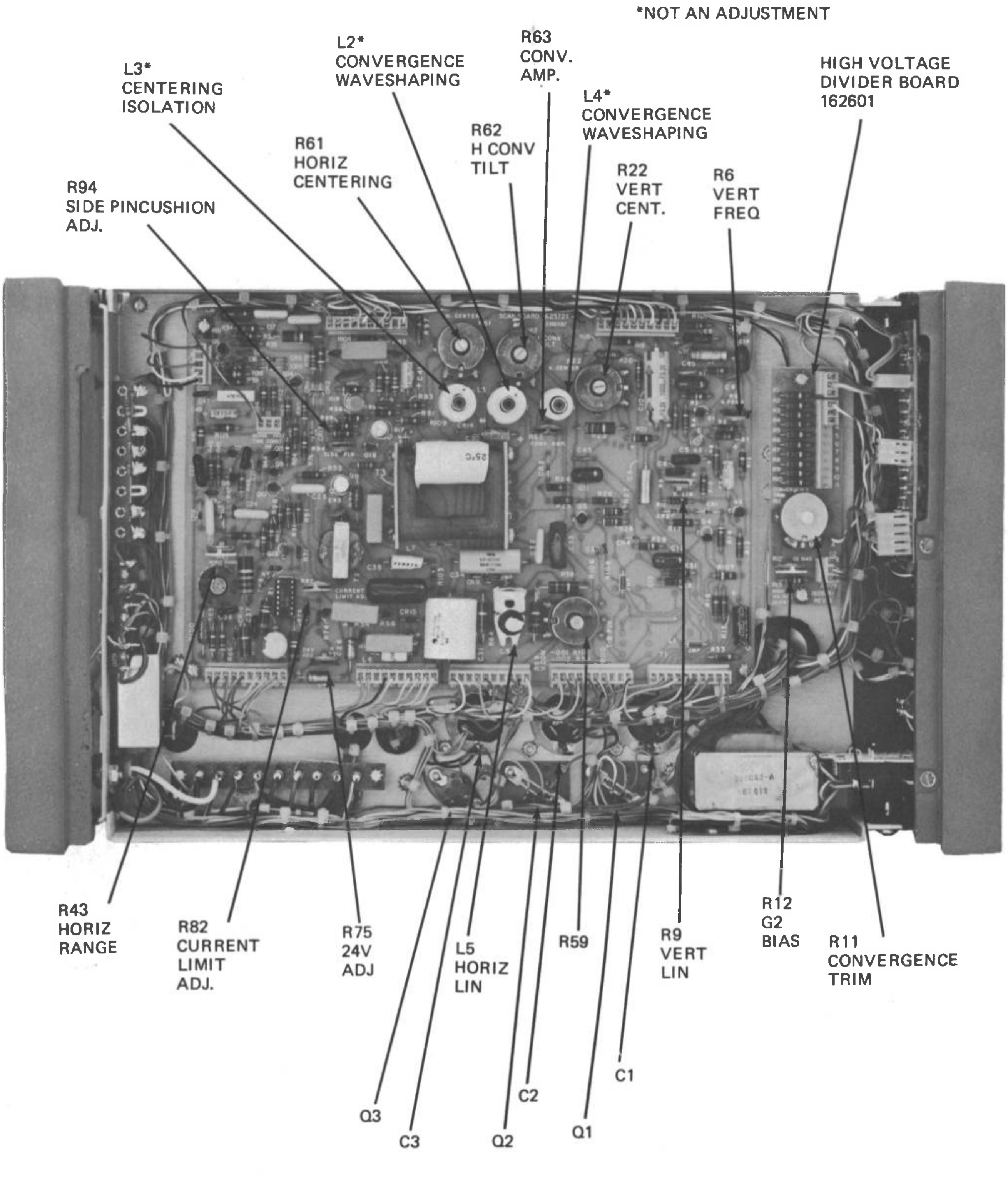


Figure 4-1. Left side view, all units

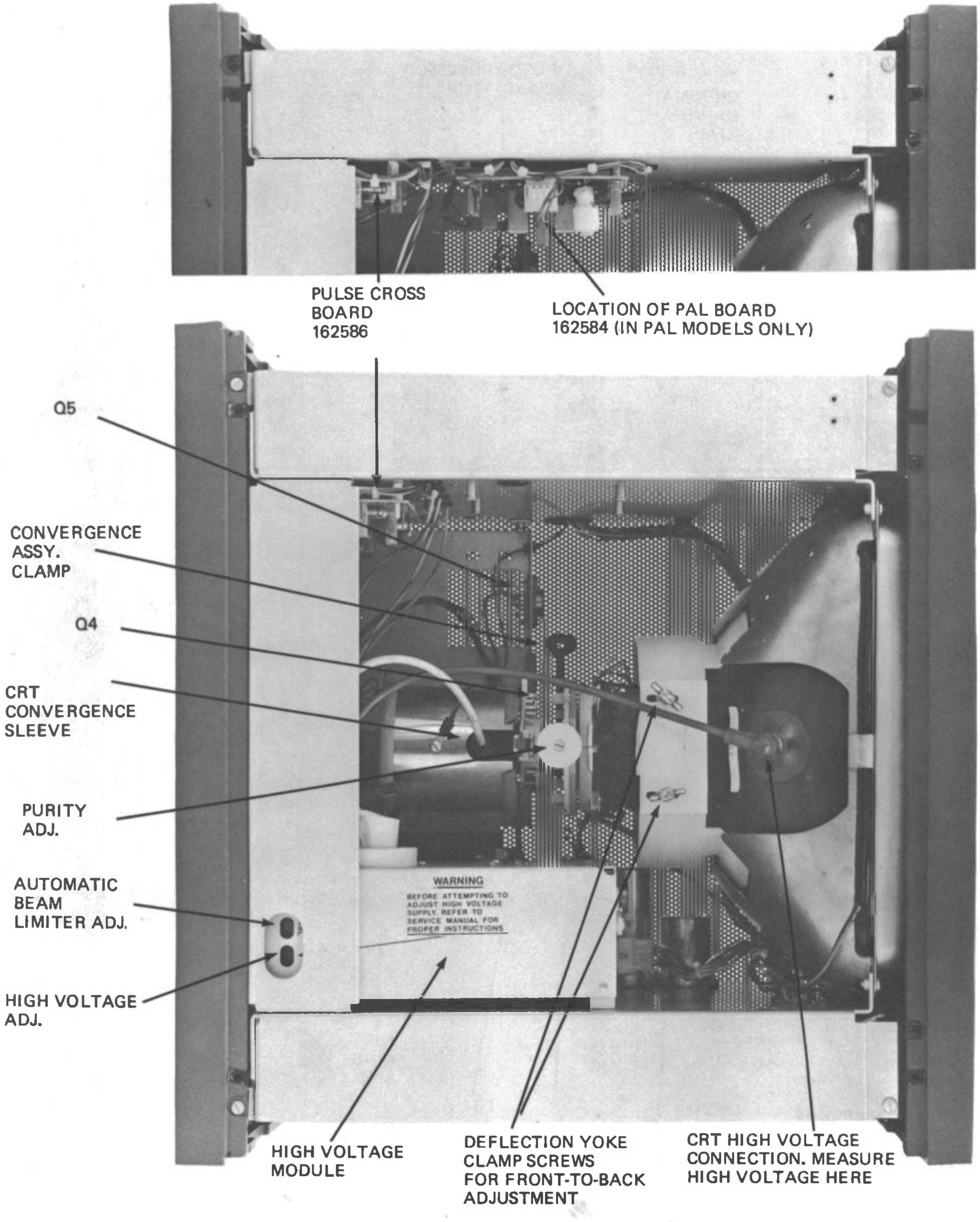

PULSE CROSS BOARD 162586
LOCATION OF PAL BOARD 162584 (IN PAL MODELS ONLY)
Q5
CONVERGENCE ASSY. CLAMP
Q4
CRT CONVERGENCE SLEEVE
PURITY ADJ.
AUTOMATIC BEAM LIMITER ADJ.
HIGH VOLTAGE ADJ.
WARNING
BEFORE ATTEMPTING TO ADJUST HIGH VOLTAGE SUPPLY, REFER TO SERVICE MANUAL FOR PROPER INSTRUCTIONS
HIGH VOLTAGE MODULE
DEFLECTION YOKE CLAMP SCREWS FOR FRONT-TO-BACK ADJUSTMENT
CRT HIGH VOLTAGE CONNECTION. MEASURE HIGH VOLTAGE HERE

Figure 4-2. Top view, all units

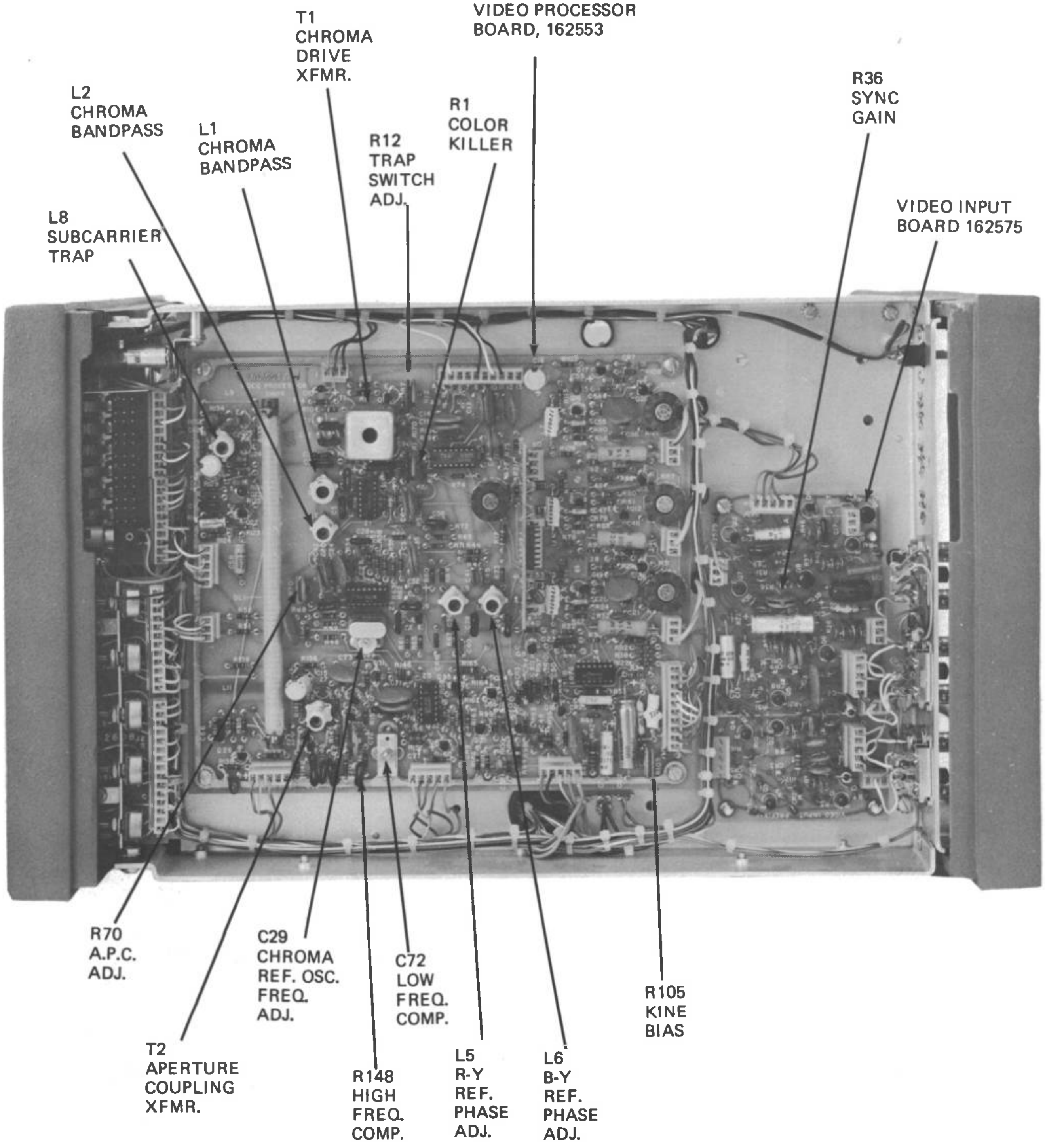


Figure 4-3A. Right side view, NTSC & PAL units, early production

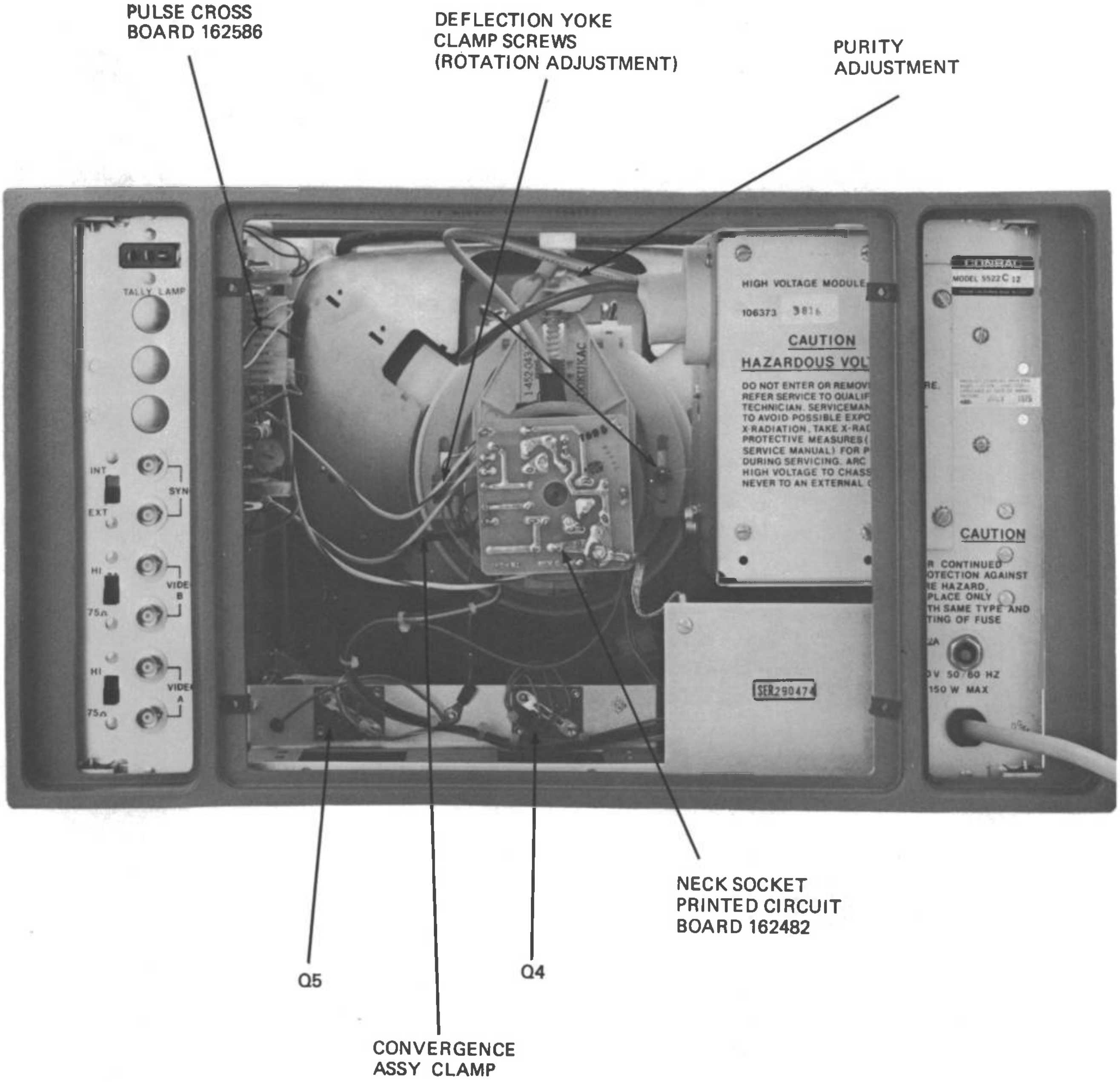


Figure 4-3B. Rear view, NTSC & PAL units, early production

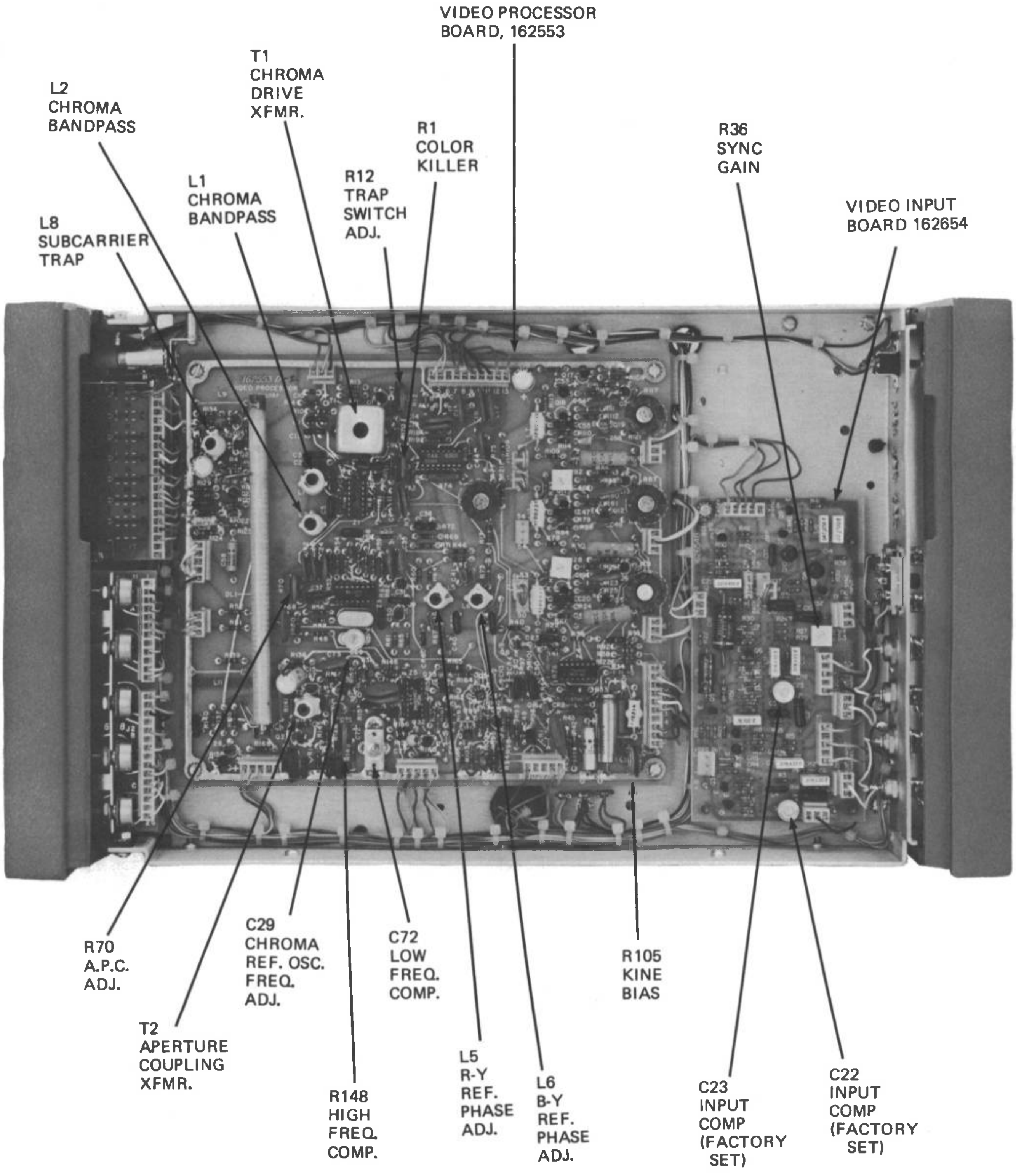


Figure 4-4A. Right side view, NTSC & PAL units, late production

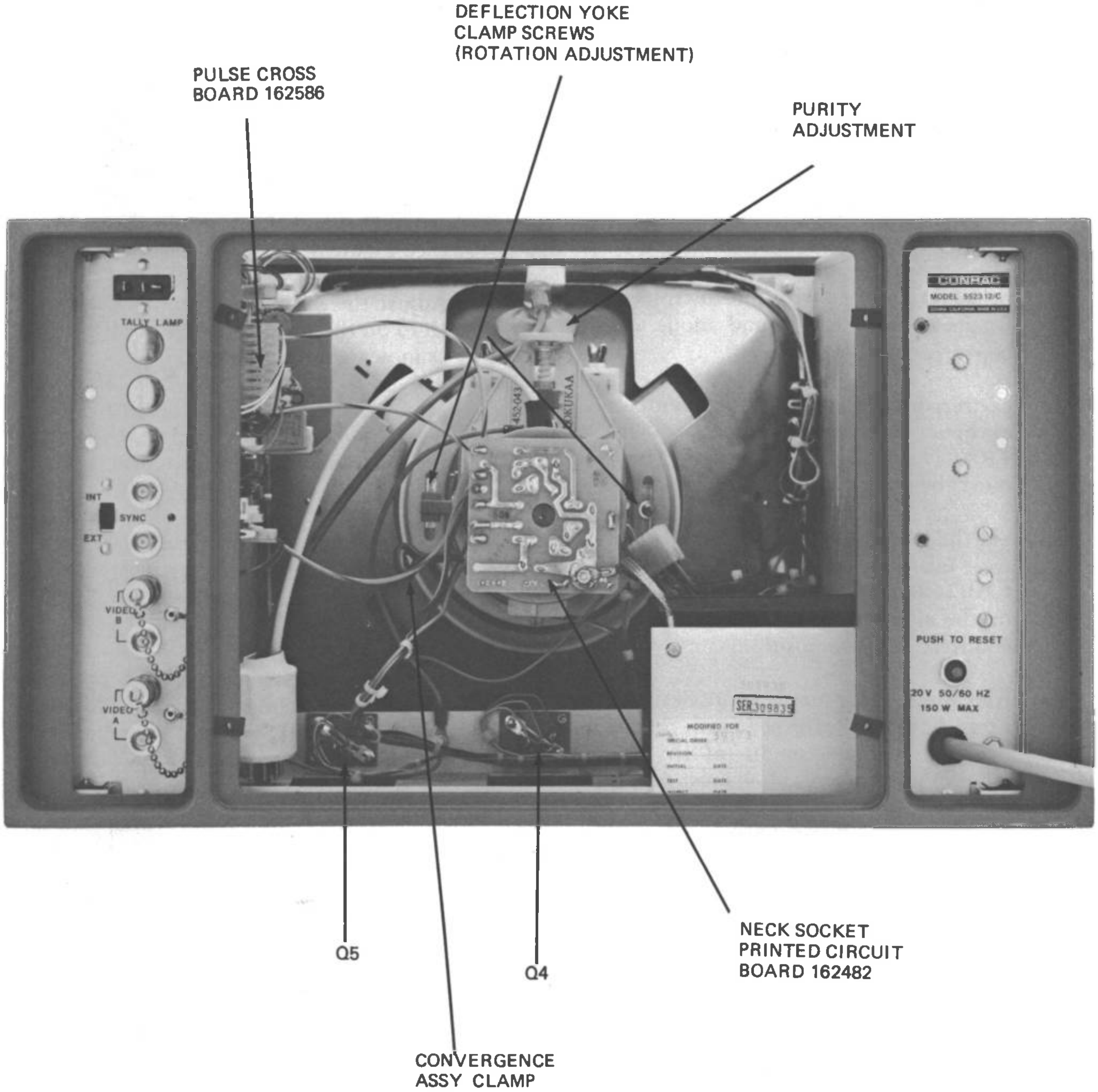


Figure 4-4B. Rear view, NTSC & PAL units, late production (with high voltage module removed)

4.4. DC Supply Voltages (PC Board 162572-1)

4.4.1. Test Conditions

a. Apply a test signal having a high white content (such as an Indian head test pattern) to the CHANNEL A INPUT.

b. Place all monitor switches off, up or to the right.

c. All voltages are to be measured using, at minimum, a 20,000 ohm/volt multimeter of ±3% of full scale accuracy. The proper matching high voltage probe is to be used with this instrument for measuring CRT second anode and convergence voltages.

d. Center, or correctly adjust, all controls except the BRIGHTNESS, CONTRAST and WIDTH controls. These must be set fully counterclockwise.

e. Set the BEAM CURRENT LIMIT control (also called the BRIGHTNESS LIMITER control on earlier units), R17 on the high voltage module, to its fully counterclockwise position.

f. All Conrac color monitors are designed using power transformers with tapped primaries, operable on 50 - 60 Hz. This allows them to be used on most supply line (mains) voltages in use throughout the world. The line voltage connection is made through jumpers on terminal board TP-1. (See system schematic diagram 452605 or 452607.) Be certain that the jumper connections are correct for the nominal power line voltage supplied in your area. Then connect the monitor to the power line.

g. Turn the monitor on.

4.4.2. Procedure

a. Set the dc voltmeter to the proper range and connect it between chassis ground (-) and the +24 volt test point (See Figure 4-1).

b. Adjust the 24 volt adjustment control (R75 on the scan board) for 24.0 volts, as indicated on the meter.

c. Measure the voltage at the +100 volt test point and verify that it is within the tolerance limit indicated in Table 4-1.

d. Measure the voltage at the +200 volt test point and verify that it is within the tolerance limit indicated in Table 4-1.

e. Using the proper high voltage probe, measure the voltage at the second anode of the CRT. Adjust the high voltage adjustment control (R16, located on top of the high voltage module) to set the voltage at 19.5 kV. Performance of the high voltage supply should conform to Table 4-1.

Line Voltage	*+24V Supply*	*+100V Supply*	*+200V Supply*	*High Voltage*
Nominal	Set to +24.0 volts, exactly	93 - 113V	190 - 210V	19.3 - 19.7 kV
Nominal +10%	23.9 - 24.1V	Within ±12V of voltage at nominal line input	Within ±0.4V of voltage at nominal line input	Within ±300V of voltage at nominal line input
Nominal -10%	23.9 - 24.1V	Within ±12V of voltage at nominal line input	Within ±0.4V of voltage at nominal line input	Within ±300V of voltage at nominal line input

Table 4-1. Power supply limits

4.5. Brightness Limiter

4.5.1. Test Conditions

a. Apply an Indian head (or any similar high white duty) test signal to channel A.

b. Adjust the contrast and brightness controls to maximum (the picture should bloom).

4.5.2. Procedure

a. Adjust beam current limit control (R17 on high voltage module 106363) until the picture no longer blooms (Refer to Figure 4-2).

4.6. Current Limiter

4.6.1. Test Conditions

a. Connect the monitor to the ac power line through a variable autotransformer. Set the autotransformer so that the applied voltage is 10% higher than nominal. (This voltage is 132 volts if the nominal voltage is 120 volts.)

b. Apply an Indian head (or any similar high white duty) test signal to channel A.

c. Using the proper high voltage probe, connect the dc voltmeter to the CRT second anode.

4.6.2. Procedure

a. Adjust the BRIGHTNESS control for picture tube cutoff.

b. Adjust the CONTRAST control for a dim picture.

c. Adjust the HV ADJUST control (R16 in the high voltage module 106363) for 25.0 kV (Refer to Figure 4-2).

d. Adjust current limit control R82 until the first signs of picture breakup are observed on the screen (Refer to Figure 4-1.).

e. Adjust the HV ADJUST control for 19.5 kV.

f. Permanently seal R82 using Eastman 910 or equivalent.

4.6.3. Requirement

a. When a jumper is connected between the collector and emitter of Q2 in the high voltage module (part number 106363), the current limiter must operate. This can be observed by picture breakup.

b. The high voltage must never, *under any condition,* exceed 26 kV.

4.7. Vertical Oscillator

a. Adjust the vertical hold control fully counterclockwise.

b. Adjust the vertical range pot (R6 on board 162572) until the picture rolls downward very slowly (about 1 frame per second) (Refer to Figure 4-1.).

c. Adjust the vertical hold control clockwise until the picture is in sync. Then turn it clockwise an additional 20° – 30°.

4.8. Horizontal Oscillator and AFC (PC Board 162572)

4.8.1. Test Conditions

a. Place the sync INT/EXT switch to EXT.

b. Set the horizontal hold control to its mid-position.

4.8.2. Procedure

a. Refer to Figure 4-1 and adjust the horizontal range control so that the picture just floats slowly from side to side. (It will also lose vertical sync. Disregard this.)

b. Return the sync INT/EXT switch to INT and verify that the picture locks.

4.9. Sync Delay / Pulse Cross

4.9.1. Test Conditions

a. Apply an Indian head, crosshatch or other suitable test signal to the channel A input.

4.9.2. Procedure

a. Push the H-DELAY pushbutton. The video (as displayed on the picture tube) should move horizontally to the right.

b. Adjust (if necessary) the H-DELAY ADJUST control (R8 on PC Board 162586) to position the horizontal blanking interval one-third of the way across the raster from left to right. (Refer to Figures 4-2, 4-3 and 4-4 for location of pulse cross board 162586.)

c. Adjust the H-DELAY BRIGHTNESS control until the sync tip display (blackest part of the display) is just at CRT cutoff.

d. Push the V-DELAY pushbutton. The video should move downward.

e. Adjust the V-DELAY ADJUST control (R13 on PC Board 162586) to position the vertical blanking interval to the center of the picture tube raster.

4.10. Geometry

4.10.1. Test Conditions

a. Apply a crosshatch test pattern to the CHANNEL A INPUT.

4.10.2. Procedure

a. Refer to Figure 4-1 and adjust the side pincushion potentiometer, R94 on PC Board 162572, for the straightest possible vertical lines at the edges of the raster.

b. Adjust the height and width controls for 3% overscan.

c. Refer to Figure 4-1 and adjust the vertical linearity potentiometer, R9, and the vertical centering potentiometer, R22, both on PC Board 162572, for the best vertical linearity.

d. Refer to Figure 4-1 and adjust the horizontal linearity coil, L~~4~~5, and horizontal centering potentiometer, R61, both on PC Board 162572, for the best horizontal linearity.

4.11. Purity (Beam Landing) Adjustments

4.11.1. Test Conditions

a. Face the monitor in the same direction (North, East, South or West) in which it is to face when in actual operation. If this cannot be exactly determined, or is subject to change, face the monitor East or West.

b. Apply a crosshatch signal to the CHANNEL A INPUT.

c. Place all switches in their normal operating positions.

d. Degauss the monitor thoroughly (preferably by using a hand-held coil).

4.11.2. Procedure

a. Adjust the contrast and brightness controls as necessary to optimally display the crosshatch pattern. Only the lines should be visible, not the gray field background. The brightness and contrast should be adjusted so that the background is black. If necessary, adjust the focus control for optimum focus.

b. Refer to Figure 4-1. First adjust the horizontal static convergence. Select the best tap from among the eleven voltage divider taps on PC Board 162601 and adjust convergence trim potentiometer R11 to produce the best convergence of the red, green and blue vertical lines at the center of the screen.

c. Refer to Figure 4-1 and adjust the beam alignment current trim potentiometer, R59 on scan board 162572, to produce the best convergence of the horizontal lines at the center of the screen.

d. Set the contrast control at minimum (fully counterclockwise) and the brightness control at or near maximum (fully clockwise), as needed, to produce a bright raster (approximately 20 foot-lamberts).

e. Turn the red and blue beam switches off (See ① in Figure 2-1).

f. Refer to Figure 4-2 and loosen the deflection yoke clamps. Slide the yoke forward against the bell of the picture tube. The screen will probably resemble Figure 4-6 B.

g. Adjust the purity magnet knob (Figure 4-6A) to make the screen look like Figure 4-6C, with the green area centered.

h. Slide the deflection yoke back until the entire screen is a uniform green.

i. Check the red and blue rasters for uniform purity by switching on the red and blue beams, one at a time.

j. Check to be sure that the raster is level, observing the scanning lines or horizontal crosshatch lines. Securely tighten the yoke clamp screws.

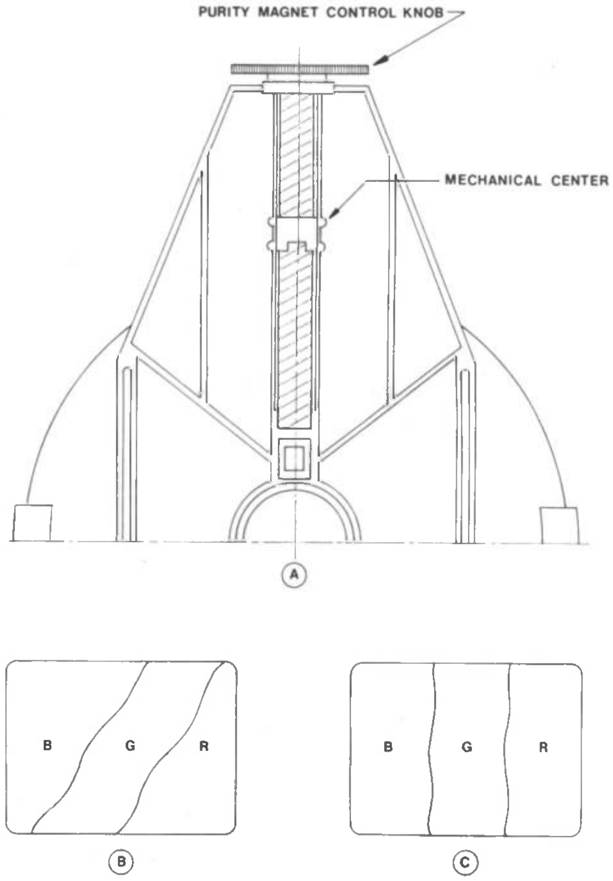


Figure 4-6. Purity adjustment

k. If impurity is noted near a corner, affix a small disc magnet to the plastic deflection yoke holder using double-sided tape. Two sizes of adhesive coated magnets are available – part number 314024, 10 mm; and part number 314023, 15 mm. Determine by experiment which magnet gives the best purity, and its optimum location.

l. After affixing the disc magnets, thoroughly degauss the monitor. Then re-check the purity.

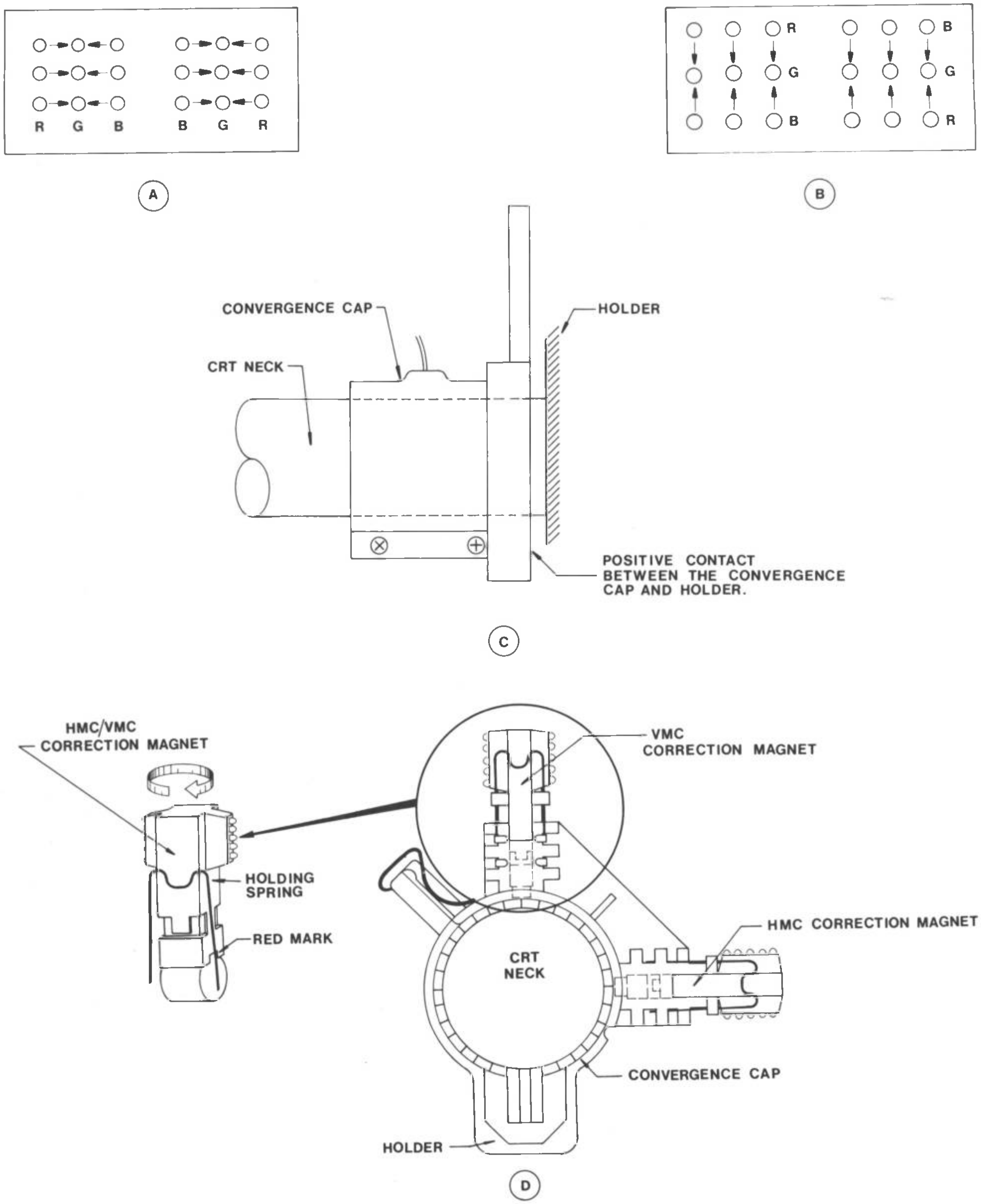


Figure 4-7. Convergence adjustment

4.12. Convergence Adjustment

4.12.1. Test Conditions

a. Verify that *all* of the preceding alignment steps (4.1 to 4.11) have been completed prior to beginning the convergence adjustments.

b. The monitor must be thoroughly warmed up and degaussed, preferably using a hand-held degaussing coil.

c. Apply a crosshatch test pattern to the channel A input.

4.12.2. Procedure

a. Adjust the CONTRAST AND BRIGHTNESS controls to optimally display the crosshatch test pattern. Only the lines should be visible, not the gray field background. The brightness and contrast should be adjusted so that the background is black.

b. Refer to Figures 4-1 and 4-7. To adjust the horizontal static convergence, select the best tap from among the eleven voltage divider taps on PC Board 162601. Preset convergence trim potentiometer R11 to the center of its range. Then select the voltage divider tap which gives the best convergence (See Figure 4-7A.).

c. Adjust the vertical static convergence control, R59 on scan board 162572, to converge the horizontal red, green and blue lines at the center of the screen (See Figure 4-7B.).

d. If misconvergence of one of the colors cannot be eliminated at the center of the screen by following steps *b.* and *c.* above, the HMC/VMC correction magnet assembly should be installed on the picture tube neck (See Figure 4-7, C and D.).

e. Slide the HMC magnet assembly horizontally, as needed, to converge the red and blue lines with the green line at the center of the screen (See Figure 4-8, A and B.).

f. Re-check the purity adjustments.

g. Refer to Figure 4-1. Adjust the convergence tilt control, R62 on PC Board

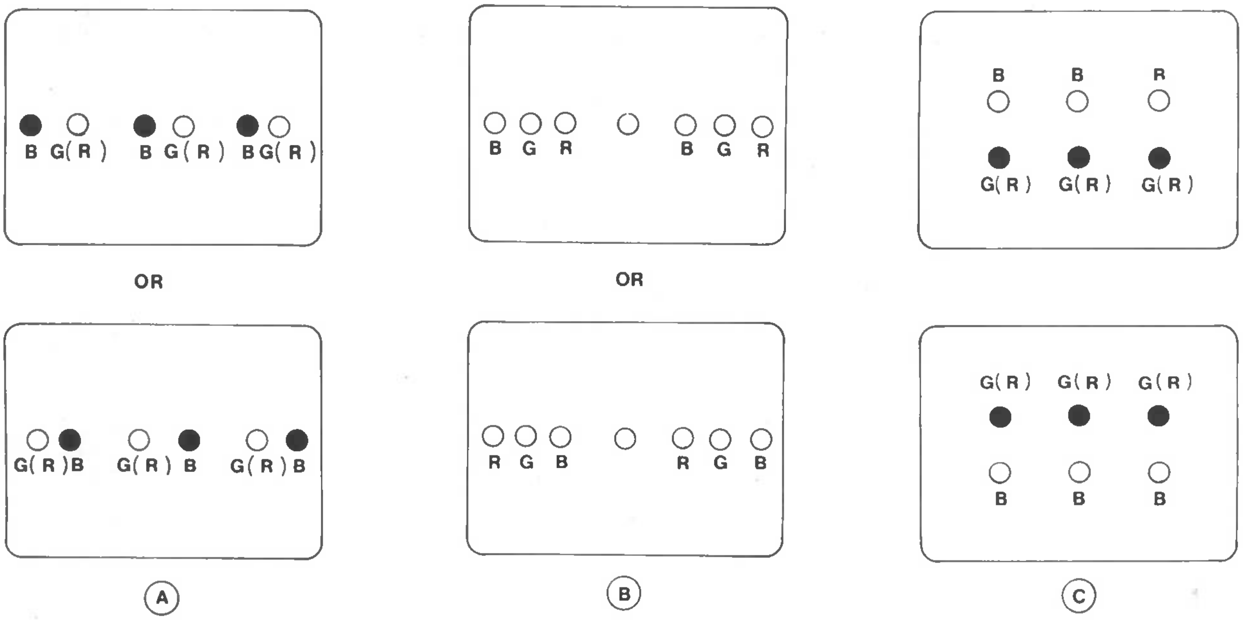


Figure 4-8. Dynamic convergence adjustment

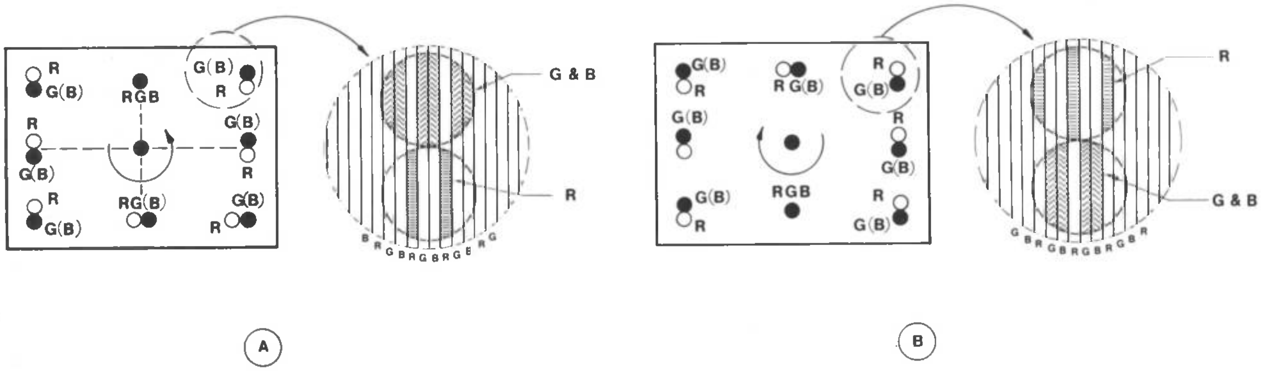
162572, to produce the best convergence of vertical lines at the right and left edges of the screen. If exact convergence cannot be obtained, set the control to equalize the error, as shown in Figure 4-8C.

h. Refer to Figure 4-1. Adjust the convergence parabola amplitude control, R63 on the scan board 162572, to produce the best convergence of the vertical lines at the right and left sides of the screen. Repeat adjustment of the static convergence control R59, 11 and convergence tilt control R62, as needed, to produce the best overall convergence of the vertical lines.

i. Following completion of the above adjustments, residual errors may be noted which may be described as a rotation of the red or blue rasters (illustrated in Figure 4-9, A and B). These can be compensated by tilting the deflection yoke up or down, as illustrated in Figure 4-9C. To do this, loosen screws A-B, as shown in Figure 4-9D. Tilt the yoke to produce the best overall convergence. Tighten screws A-B securely.

CAUTION: DO NOT USE A MAGNETIZED SCREWDRIVER !

j. Repeat steps *b.* and *i.* until no further improvement occurs.



To correct this condition (to move the red dot as indicated by the arrow), raise the front edge of the yoke.

To correct this condition (to move the red dot as indicated by the arrow), lower the front edge of the yoke.

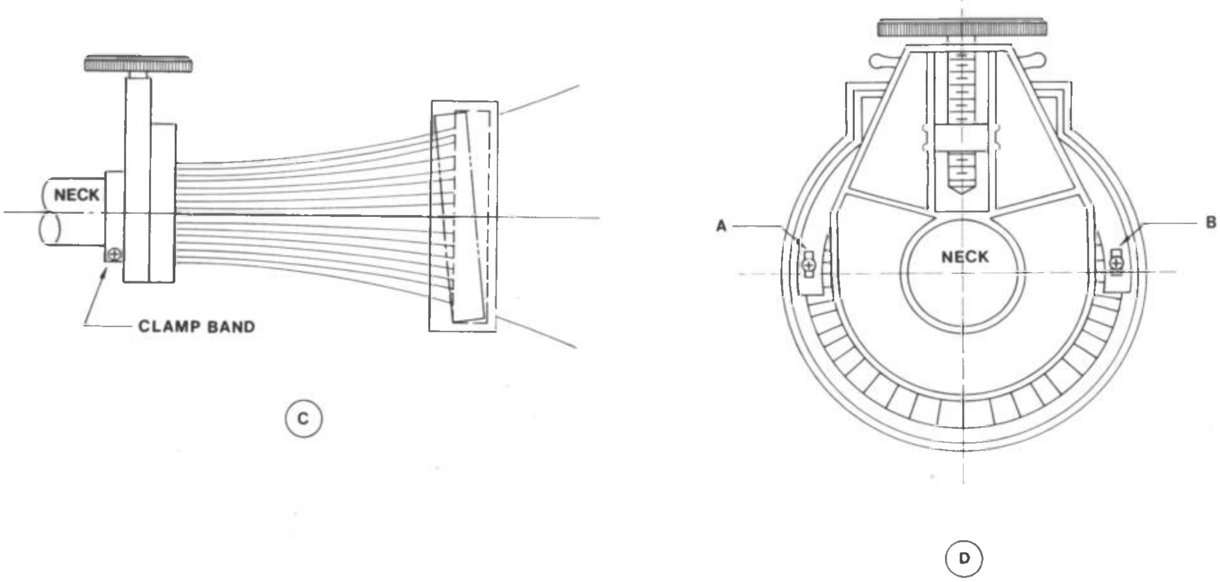


Figure 4-9. Yoke adjustment to optimize convergence

Corner Convergence Improvement Magnets:

If the above convergence procedure has been followed, optimum convergence should be obtained unless the CRT or deflection yoke has been replaced. If either the CRT or yoke has been replaced, some misconvergence in the corners may remain. These errors can be reduced by applying correction magnet assembly, part number 314046. This assembly consists of a plastic strip approximately 6 inches long x ¼ inch wide with a small magnet embedded at one end, and fitted with double-sided adhesive tape on the handle.

Note that this is not a routine adjustment. It should be necessary only following replacement of either the CRT or deflection yoke.

With a crosshatch pattern applied, slide the magnet end of the assembly between the deflection yoke coils and the glass bell of the picture tube, behind the area of the screen to be converged. Move the magnet around to find the position of best convergence by trial and error. Then peel off the backing tape and press the adhesive surface firmly against the tube glass bell. If the handle is too long to clear the metal tube shield, it may be cut off with a pair of diagonal cutters. Typically, two or three of these magnets are required.

4.13. Subcarrier Trap (PC Board 162553)

4.13.1. Test Conditions

a. Apply a standard NTSC (or PAL) color bar signal to the CHANNEL A INPUT.

b. Refer to Figure 4-3 or Figure 4-4. Connect an oscilloscope to the collector of transistor Q14 on the 162553 circuit board.

4.13.2. Procedure

a. Refer to Figure 4-3A or Figure 4-4A for the location of each adjustment control in the following steps.

b. Adjust color killer control, R1 on the 162553 board, fully counterclockwise (forced color operation).

c. Adjust the trap switch control, R12 on the 162553 board, clockwise until the subcarrier trap begins to remove the subcarrier from the staircase waveform displayed on the oscilloscope.

d. Adjust the subcarrier trap coil, L8, for best null of the subcarrier on the staircase waveform.

e. Adjust R12 to the point of best null and then another 5° clockwise. Leave R1 in its fully counterclockwise position.

4.14. Response Compensation Amplifier (PC Board 162553)

4.14.1. Test Conditions

a. Apply a $\sin^2$ 2T pulse and bar test signal to the CHANNEL A INPUT.

b. Refer to Figure 4-3A or 4-4A. Connect an oscilloscope with a 100X attenuator probe to the collector of the blue output transistor Q7 (on PC Board 162553).

c. Adjust the CONTRAST control for 20 volts p-p output.

d. Refer to Figure 4-3A or 4-4A. Adjust the color killer pot, R1, fully clockwise for forced monochrome operation.

e. Set the APERTURE control fully counterclockwise to remove aperture correction.

4.14.1. Procedure

a. Switch to channel A. Refer to Figure 4-3A or 4-4A and adjust C72 and R148 for best response. Refer to Figure 4-10 and adjust so there is less than 5% distortion of the pulse and bar signal.

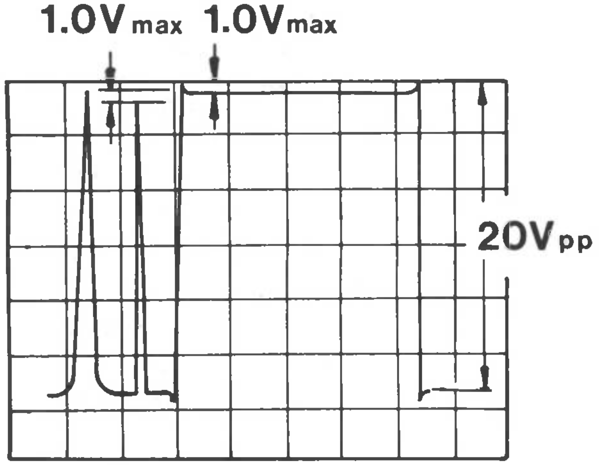


Figure 4-10. Correct $\sin^2$ 2T pulse and bar response pattern

4.15. Brightness Pulse (PC Board 162553)

4.15.1. Test Conditions

a. Adjust the CONTRAST control R10, to minimum.

b. Refer to Figure 4-3A, or 4-4A and connect an oscilloscope, through a 10X low capacitance probe, to the emitter of Q33.

c. Apply a standard color bar test signal to the channel A input.

4.15.2. Procedure

a. Refer to Figure 4-3A or 4-4A. Adjust the BRIGHTNESS PRESET control R8 back and forth while observing the presentation on the oscilloscope. Observe that the pulse can be adjusted so that it is positive or negative with respect to the reference line (on either side of it).

b. Adjust R8 to set the peak amplitude of the pulse equal to the reference line.

4.16. Gray Scale

4.16.1. Test Conditions

a. Set the scan switch to the normal (full scan) position.

b. Apply a white window test pattern to the CHANNEL A INPUT.

c. Set the BRIGHTNESS control at the physical center of its range.

d. Set the CONTRAST control at the physical center of its range.

e. Set the red, green, and blue highlight controls to the one-quarter clockwise position.

4.16.2. Procedure

a. Place the setup switch in the setup position.

b. Adjust the red, green and blue background controls for 150 V dc at the red, green, and blue CRT cathodes, respectively.

c. Adjust the G1 bias control for minimum brightness. R105 Kine Bias

d. Adjust the G2 bias control for a dim colored bar.

e. Turn off the gun which corresponds to the dominant color of the setup line.

f. Repeat step *d.* as necessary.

g. Turn off the gun that does not correspond to the dominant color of the setup line. The remaining gun should be the one with minimum sensitivity.

h. Adjust G2 for a dim bar of this color.

i. Turn ~~of~~ on the gun that was turned off in step *g*. Adjust the background control of this color until both colors are approximately the same intensity.

j. Turn on the remaining gun and adjust the background control of this color until all three colors are approximately the same intensity. The bar should look gray at this point. It should be possible to achieve a gray setup bar, without adjusting the gun of minimum intensity, by adjusting the other two guns to meet it.

k. Place the setup switch in the normal position.

l. Adjust the BRIGHTNESS control for just visible black one-inch from the vertical edges of the window.

m. Adjust the red, green, and blue highlight controls for a white window.

NOTE: These controls should be left between 10% and 50% of their fully clockwise rotation to allow for correction due to future change of picture tube cathode emission.

n. Set the color comparator to the low luminance position (l fL). Readjust the red, green, and blue background controls for color, and brightness control for luminance, so that the black area around the edge of the window has the same color and luminance as the D6500 on the footlambert standard.

o. Re-check steps *f.*, *g.*, and *h.*, and repeat *a.* through *n.* if necessary. If readjustment is not necessary, proceed to step *p*.

p. Set the comparator to the high luminance position (20 footlamberts). Readjust the red, green, and blue highlight controls for color match and readjust the contrast control for ~~color and~~ luminance match in the center of the window.

q. Re-check step *n*.

r. Switch the BRIGHTNESS control to the preset position. Adjust the BRIGHTNESS PRESET control for the desired black background.

s. Switch the CONTRAST control to the preset position. Adjust the CONTRAST PRESET control for 20.0 footlamberts with the footlambert meter at the center of the window.

4.16.3. Requirement

a. As the CONTRAST control is varied from maximum to minimum luminance, the color temperature of the window must not change.

4.17. Chroma Bandpass (PC Board 162553)

NOTE: Two procedures are given for chroma bandpass alignment. The first procedure requires the use of a video sweep generator and is the preferred method. The second method requires only the use of a standard NTSC (or PAL) color bar pattern. This method should be used only when a video sweep signal is unavailable. If properly performed, however, this method will produce very acceptable results, due to the phase linear nature of Conrac's chroma bandpass amplifiers.

4.17.1. Test Conditions (Procedure A)

a. Refer to Figure 4-3A or 4-4A for all steps.

b. Apply a 10 MHz composite video sweep signal to input channel A.

c. Connect an oscilloscope to pin 5 on coil L7.

d. Set the CONTRAST control to mid-range.

e. Set the CHROMA control to mid-range.

f. Set color killer control R1 to the fully counterclockwise position for forced color operation.

4.17.2. Procedure (Procedure A)

a. Adjust T1 for maximum amplitude at 3.58 MHz (4.43 MHz for PAL-B).

b. Adjust L1 and L2 for the most symmetrical response around 3.58 MHz (4.43 MHz for PAL-B) and flat from 3.08 to 4.08 MHz (3.4 to 5.4 MHz for PAL-B).

NOTE: L1 affects the high frequency and L2 affects the low frequency. The response must be as shown in Figure 4-11.

4.17.3. Test Conditions (Procedure B)

a. Refer to Figure 4-3A or 4-4A for all steps.

b. Apply a standard NTSC (or PAL) color bar signal to input channel A.

c. Connect an oscilloscope to pin 5 on coil L7.

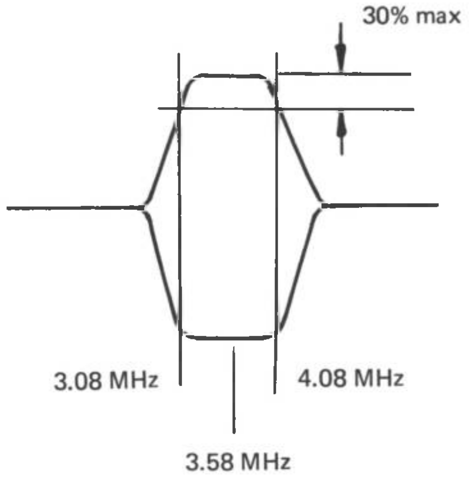
d. Set the CONTRAST control to mid-range.

e. Set the CHROMA control to mid-range.

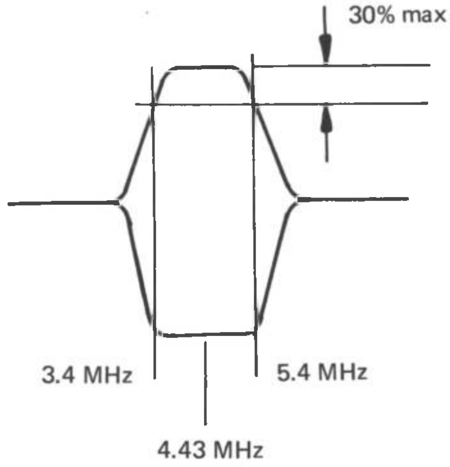
f. Set color killer control R1 to the fully counterclockwise position for forced color operation.

4.17.4. Procedure (Procedure B)

a. Adjust T1 for maximum amplitude of the color bar signal.



A. NTSC & PAL - M



B. PAL - B

Figure 4-11. Chroma bandpass

b. Adjust L1 and L2 for maximum amplitude of the color bar signal.

4.18. Color Oscillator Adjustment (PC Board 162553)

4.18.1. Test Conditions

a. Apply a standard NTSC (or PAL) color bar test signal to the CHANNEL A INPUT.

b. Set the CHROMA PHASE control to preset. Adjust the preset phase to the physical center of its range.

c. Refer to Figure 4-3A or 4-4A. Set the APC control, R70, to the physical center of its range.

4.18.2. Procedure

a. Refer to Figure 4-3A or 4-4A for all steps.

b. Connect a short jumper between pin 11 of Z3 (junction of R47 and R59) and pin 12 of Z3 (junction of R46 and R58). This defeats the APC loop and causes the color oscillator to free run.

c. Adjust C29, the color oscillator tuning capacitor, so that the color bars drift as slowly as possible through sync.

d. Remove the jumper installed in step *a.* above and verify that the color oscillator pulls into sync.

4.19. Color APC Loop (and PAL ID) (PC Board 162553)

4.19.1. Test Conditions

a. Apply a standard NTSC (or PAL) color bar signal to the CHANNEL A INPUT.

4.19.2. Procedure (for NTSC monitors ONLY).

a. Refer to Figure 4-3A or Figure 4-4A.

b. Connect an oscilloscope, through a 10X low capacitance probe, to R121, the red output.

c. Adjust L5, R-Y reference phase, for approximately correct red bars.

d. Adjust the contrast control, R9 on the chassis, slowly counterclockwise and look for phase shifting on the red bars. Phase shifting is evidenced by the changing of the relative amplitudes of the different bars.

e. Adjust the color APC potentiometer R70, for minimum amplitude change on the bars.

f. Re-adjust the contrast control for 50 volts peak-to-peak at the red output.

4.19.3. Requirement (for NTSC monitors)

a. The relative color bar amplitude must remain constant from minimum contrast to 50 volts peak-to-peak.

4.19.4. Procedure (for PAL monitors ONLY.)

a. Refer to Figure 4-2.

b. Connect an oscilloscope, through a 10X low capacitance probe, to either end of R16 on board 162584 and observe the ½H frequency waveform. Adjust L3 on board 162584 for maximum amplitude of the sine wave.

c. Place the PAL-S/PAL-D switch in the PAL-S position. Connect the scope probe to R121, the red output.

d. Perform steps *b.* through *e.*, inclusive, of section 4.19.2.

4.19.5. Requirement (for PAL monitors).

a. Relative color bar amplitude must stay constant from minimum contrast to 50 volts peak-to-peak.

b. Color bars must remain locked and in proper phase (must not invert 180° or alternate phase), as the contrast is adjusted from 1 volt peak-to-peak to 50 volts peak-to-peak at the output.

4.20. U - V Component Separation (PAL Monitors ONLY) (PC Board 162584)

4.20.1. Test Conditions

a. Connect a PAL standard color bar signal to the CHANNEL A INPUT.

b. Set the chroma amplitude and phase

controls to preset. Set the preset controls to mid-position.

c. Place the PAL-S/PAL-D switch in the PAL-D position.

d. Refer to Figure 4-3A or 4-4A. Connect the oscilloscope, through a 10X low capacitance probe, to pin 9, the V-in connection on the video processor board (162553).

4.20.2. Procedure

a. Refer to Figure 4-2.

b. Turn off the V component at the generator. On the PAL board (162584), adjust R7 to mid-position. Adjust L1 for a small amount of U component displayed on the scope. Adjust L2 for minimum (null) U component on the scope. Adjust L1 for minimum (null) U component on the scope.

c. Adjust R7 for minimum (null) of the U component. Touch up the adjustment of L1 for minimum (null) of the U component.

4.20.3. Requirement

a. The ratio between the output of the V channel (pin 9 on board 162553), with the V channel turned off at the generator and with the V channel turned on at the generator, must be greater than 20 dB (10:1).

4.21. Color Demodulator (PC Board 162553)

4.21.1. Test Conditions

a. Apply a standard NTSC (or PAL) color bar signal to the CHANNEL A INPUT. Full-field bars are preferred.

b. Refer to Figure 4-3A or 4-4A.

c. Connect an oscilloscope with a 10X low capacitance probe to R37, the blue output, R61, the green output, or R121, the red output, as required by the procedure.

d. Set the contrast control for 50V black to white.

e. Set the chroma control and phase control to preset.

f. *For PAL monitors only,* place the PAL-S/PAL-D switch in the PAL-S position.

4.21.2. Procedure

a. With the oscilloscope probe on the red output, adjust the chroma preset, R4, and R-Y reference phase adjust, L5, for a red bar display similar to Figure 4-12A.

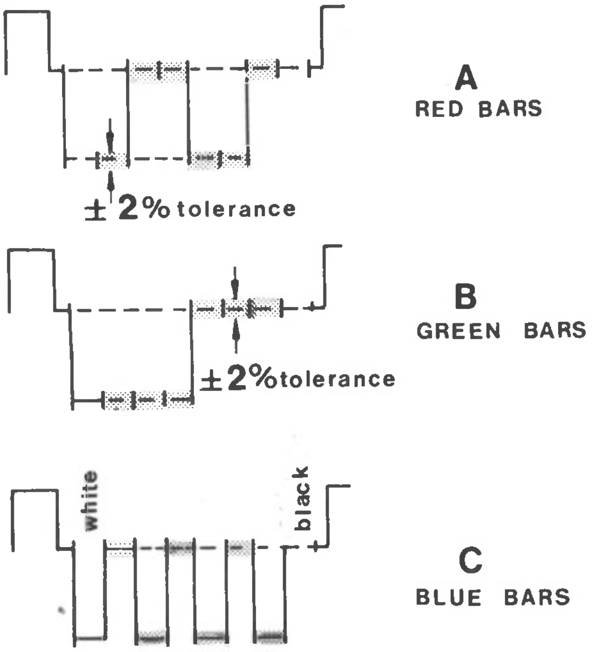
b. With the probe on the blue output, adjust L6, the B-Y reference phase adjust, and R28, blue chroma trim, for a blue bar display similar to Figure 4-12C.

c. With the probe on the green output, adjust R82, the green chroma trim, for a green bar display similar to Figure 4-12B.

d. Repeat steps *a.*, *b.*, and *c.* until all three outputs are similar to Figure 4-12 (A-C) at the same time.

4.21.3. Requirement

a. Each bar must be either 0 or 100% luminance as shown on Figure 4-12 (referred to the black and white bars, within ±2%).



NOTE: (On PAL units only)
Scope display will appear as two traces out of phase, superimposed on each other. Proper adjustment is achieved when both traces coincide to become one.

Figure 4-12. Chroma demodulator adjustment

b. *For PAL monitors only,* the maximum change in the bars between PAL-S and PAL-D must be less than 1%.

4.22. Color Killer Adjustment (PC Board 162553)

4.22.1. Test Conditions

a. Apply an Indian head or similar monochrome test signal to input channel A.

b. Refer to Figure 4-3A or 4-4A. Preset color killer control, R1, fully counterclockwise.

4.22.2. Procedure

a. Observe colored noise in the monochrome display.

b. Refer to Figure 4-3A or 4-4A . Slowly rotate color killer control R1 clockwise until the colored noise just disappears.

4.23. Pulse Cross Adjustments (PC Boards 162586 and 162608)

4.23.1. Requirement

a. The pulse cross circuit, when actuated, introduces a delay into the vertical and/or horizontal sync so that the sync interval/s can be displayed on the picture tube. The adjustments should be made so that the displayed sync interval/s appear in the desired location on the CRT screen.

4.23.2 Procedure

a. Depress the front panel V-DELAY switch (11 in Figure 2-1).

b. Adjust pot R13 on circuit board 162586 so that the vertical interval is approximately in the center of the raster.

c. Depress the front panel H-DELAY switch (11 in Figure 2-1).

d. Adjust pot R8 on circuit board 162586 so that the horizontal interval is displayed in the desired location on the screen. (Usually this is approximately 1/3 of the distance from the left side.)

e. Adjust pot R6 on circuit board 162608 so that the blanking intervals appear gray, with the sync pulses inside the blanking intervals appearing black.

SECTION 5

ALIGNMENT PROCEDURE FOR RGB MONITORS

5.1. Equipment and Signals Required

The equipment and signals required for proper alignment of the RGB monitors is the same as outlined in sections 4.1 through 4.3 for alignment of the NTSC and PAL monitors, with the following exceptions:

No color bar generator is needed. The Tektronix model 147 signal generator is recommended.

The oscilloscope must have dual-trace with A-B capability and 10 mV per division sensitivity. A 1X probe is required for each channel input.

If no Indian head test signal is available, the *Composite* test signal from the Tektronix generator will suffice.

5.2. Initial Procedure

a. Perform all steps in sections 4.4 through 4.12, inclusive, and section 4.23, as outlined for the NTSC and PAL monitors. Apply the test signals to the test signal input.

5.3. RGB Tracking Amplifier Adjustment

5.3.1. Test Conditions

a. Apply a window test signal to the test input.

b. Refer to Figure 4-5 A. With the dual trace oscilloscope set to 10 mV/division vertical sensitivity and A-B operation, connect the channel A scope input to the base of Q1 (Q17 on board 162577 in early units) on the RGB video output board through a 1X probe. Similarly, connect the channel B scope input to the base of Q7 (Q8 on board 162577 in early units) through a 1X probe.

c. Refer to Figure 5-1 A. Preset the three gain tracking pots, R15, R52, and R89 (R18, R154, and R101 on board 162577 in early units) to their center positions.

5.3.2. Procedure

a. Refer to Figure 5-1 A for all steps.

b. Adjust the CONTRAST control to the mid-position.

c. Adjust the green gain tracking pot, R52 (R154 on board 162577 in early units) for minimum amplitude scope display (null). It may be necessary to adjust the red gain tracking pot R15 (R101 on board 162577 in early units), to achieve null.

d. Slowly adjust the CONTRAST control from maximum to minimum and observe the tracking errors (deviation from null). Measure the maximum tracking error and measure the channel A amplitude (p-p) at these points.

e. Move the channel B scope probe to the base of Q13 (Q1 on board 162577 in early units) in the blue channel. Adjust the CONTRAST control to the mid-position. Adjust the blue gain tracking pot R89 (R17 on board 162577 in early units), for minimum amplitude scope display (null). If it is necessary to adjust the red gain tracking pot R15 (R101 on board 162577 in early units) to achieve null, repeat steps *b.* and *c.*

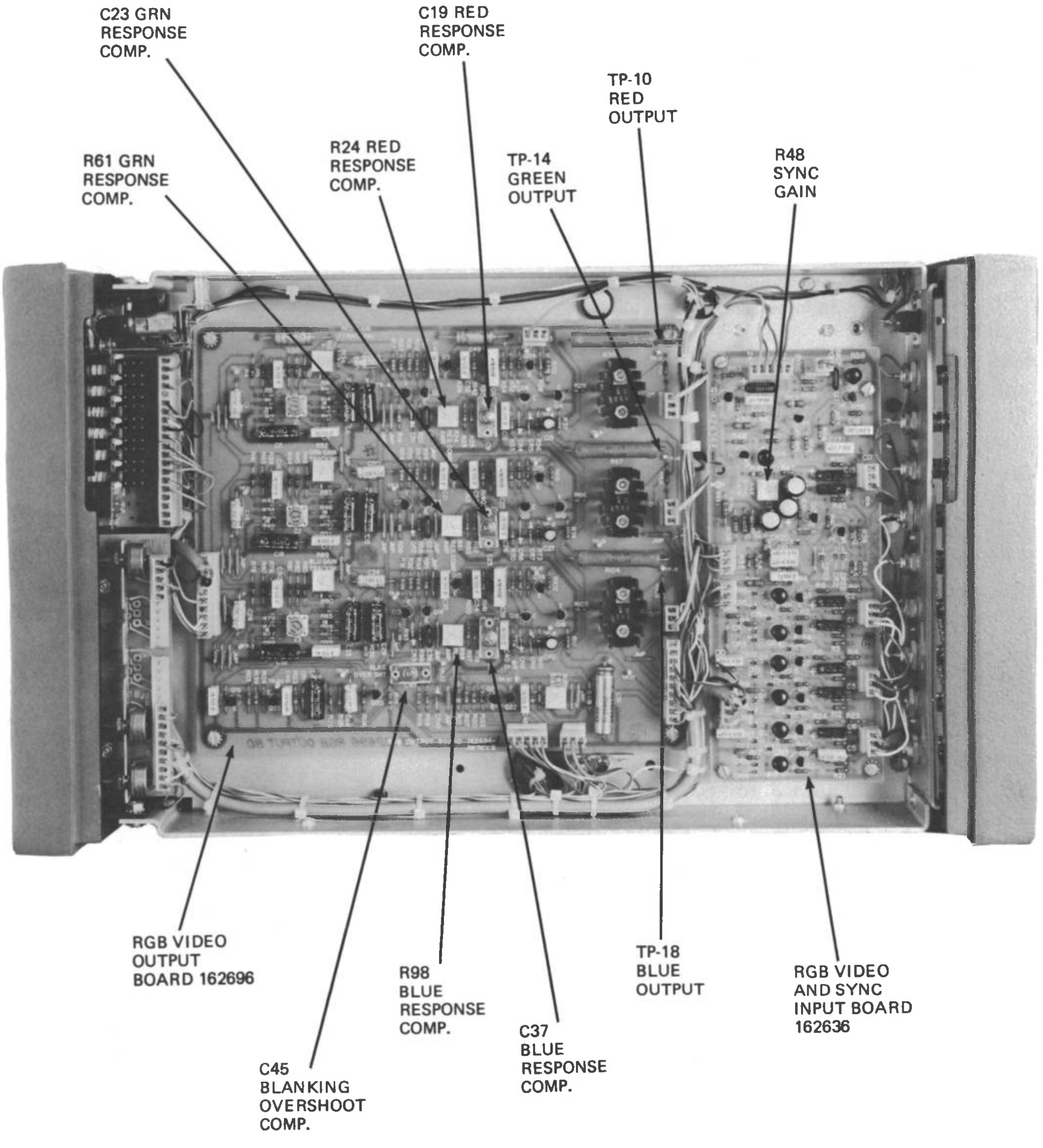


Figure 5-1A. Right side view, RGB units

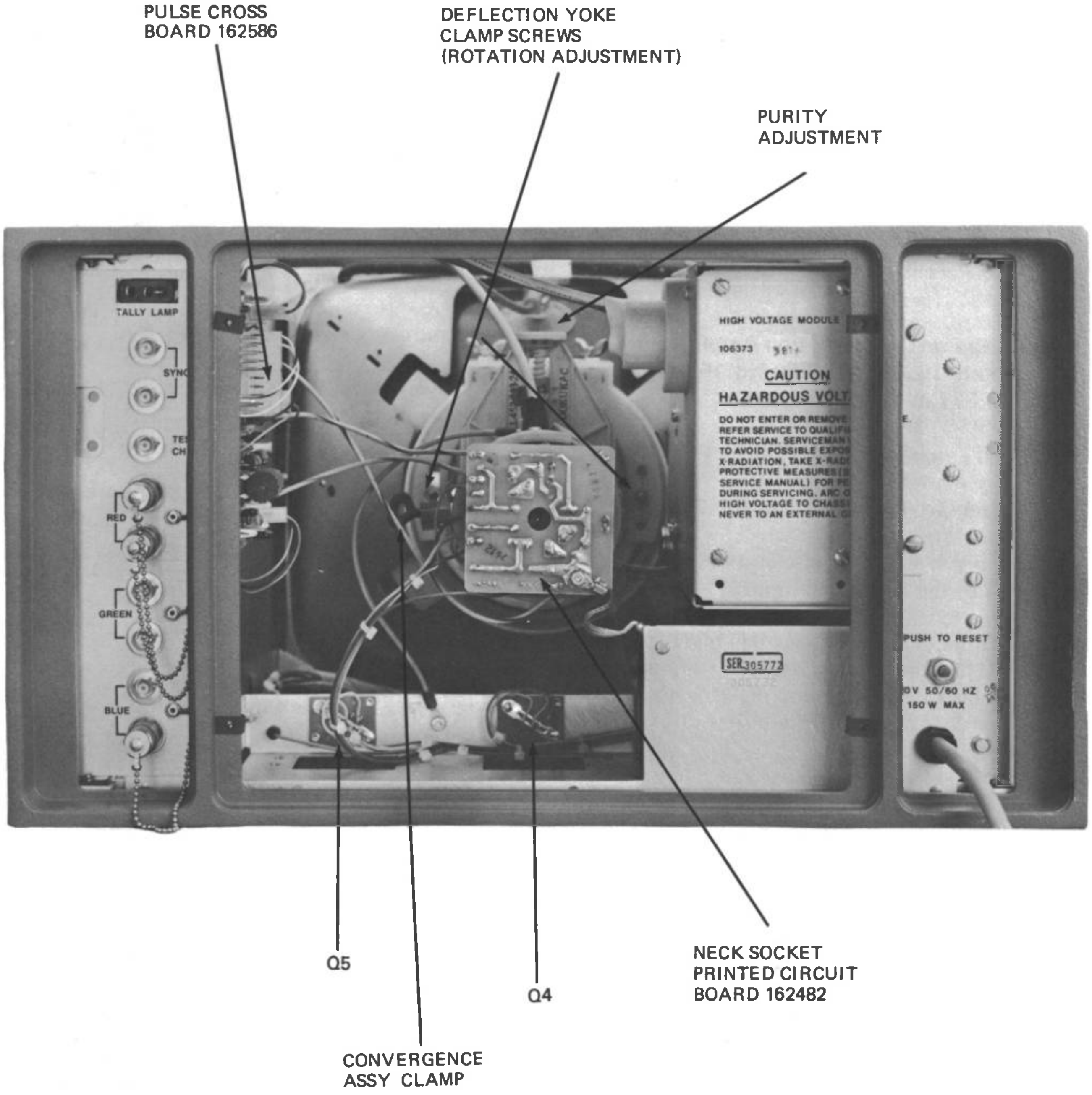


Figure 5-1B. Rear view, RGB units

f. Repeat step *c.* above.

g. Move the channel A scope probe to the base of Q7 (Q18 on board 162577 in early units) in the green channel.

h. Repeat step *c.* above.

5.3.3. *Requirement*

a. Compute the percentage of error.

$$\%\text{error} = \frac{\text{Error (volts p-p)}}{\text{Amplitude (volts p-p)}} \times 100\%$$

The maximum error must be less than 1%.

5.4. Response Compensation Amplifier (PC Board 162696) (PC Board 162627 or 162577 in earlier units)

5.4.1. *Test Conditions*

a. Refer to Figure 4-1 A for all steps.

b. Apply a $\sin^2$ 2T pulse and bar test signal to the test signal input.

c. Connect an oscilloscope through a 100X low capacitance attenuator probe to the collector of Q17 (Q6 on board 162577 in early units), the blue output transistor.

d. Adjust the contrast control for 20 volts peak-to-peak output.

5.4.2. *Procedure*

a. Refer to Figure 5-1 A for all steps.

b. Adjust C37 and R98 (C10 and R25 on board 162577 in early units) so that there is less than 1% distortion of the pulse and bar signal. The resistor controls mainly low frequencies. The capacitor controls mainly high frequencies.

c. If available, connect a 10 MHz sweep signal to the test input. Readjust the contrast control for 20 volts peak-to-peak and observe the sweep envelope. Adjust so that the envelope is flat within 1 dB from 0 to 8 MHz. (0 to 10 MHz in units using the 162696 board, only.)

d. Repeat the above for the green and red channels, adjusting R61/C23(R61/C26 on board 162577 in early units) for the green channel, and R24/C9 (R109/C44 on board 162577 in early units) for the red channel.

5.4.3. *Requirement*

a. Less than 1% distortion of the pulse and bar signal. See Figure 5-2 A.

b. Swept waveform flat with ± 1 dB. See Figure 5-2 B.

5.5 Gray Scale [Front Controls, PC boards 162696 (162627 or 162577 on early units) 162601 and 162649-1]

5.5.1. *Test Conditions*

a. Place the scan switch in the normal position (full scan).

b. Apply a white window test pattern to the test input.

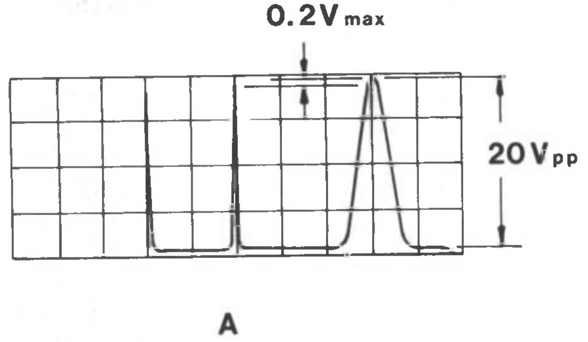
c. Set the brightness control to the preset position.

d. Set the contrast control to the physical center of its range.

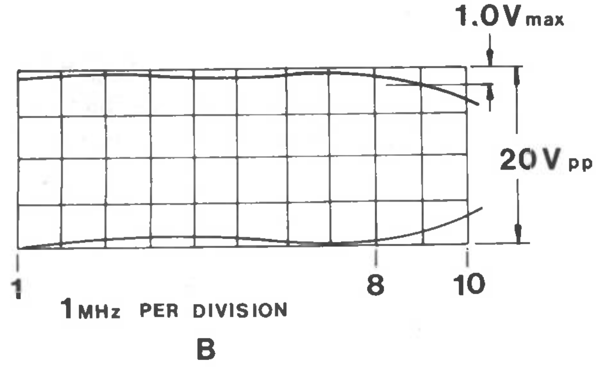
e. Set the red, green and blue background and gain controls to the physical center of their range.

f. Refer to Figure 5-1 A. Connect the oscilloscope through a 10X probe to the blue output.

g. Set the scope to 50 volts/division sensitivity, dc coupled, with the ground level at the bottom of the scale.



Pulse and Bar Response



Sweep Response

Figure 5-2. Pulse and Bar and Sweep Response Waveforms.

h. Place the setup switch in the *setup* position.

55.2. *Procedure*

a. Refer to Figure 4-1. Adjust the background reference pot, R11 on control board 162649-1, to set the black level of the blue output at +150 volts dc.

b. Refer to Figure 5-1 A. Connect the scope probe to the green and red outputs, successively, and check that the black levels are within +150 volts ±10%, respectively (PC board 162696; PC board 162627 or 162577 in earlier units).

c. Refer to Figure 5-1 A. Adjust the G1 bias control R129 on board 162696 (PC board 162627 in earlier units) (R133 on board 162577 in early units), for minimum brightness.

d. Refer to Figure 4-1. Adjust the G2 bias control for a dim-colored line (PC board 162601).

e. Turn off the gun corresponding to the dominant color of the setup line.

f. Repeat step *d.* as necessary.

g. Turn off the gun that does *not* correspond to the dominant color of the setup line. The remaining gun should be the one with minimum sensitivity.

h. Refer to Figure 4-1. Adjust the G2 control for a dim line of this color.

i. Turn on the gun that was turned off in step *g.* Adjust the background control of this color until both colors are approximately the same intensity.

j. Turn on the remaining gun. Adjust the background control of this color until all three colors are approximately the same intensity. The line should look gray at this point. It should be possible to achieve a gray set-up line, without adjusting the gun of minimum intensity, by adjusting the other two to meet it.

k. Place the set-up switch in the *normal* position.

l. Adjust the brightness control for *just* visible black one inch from the vertical edges of the window.

m. Adjust the red, green, and blue highlight controls for a white window.

Note: These controls should be left between 10% and 50% of full clockwise *rotation to allow for future change of picture tube cathode emission.*

n. Set the color comparator to the low luminance position (1 fL). Readjust the red, green and blue background controls for color, and the brightness control for luminance so that the black area around the edge of the window has the same color and luminance as the D6500 on the foot Lambert standard.

o. Re-check *f.*, *g.*, and *h.*, and repeat *a.* through *n.* if necessary. If readjustment is not necessary, proceed to step *p.*

p. Set the comparator to the high luminance position (20 foot Lamberts). Readjust the red, green, and blue highlight controls for color and the contrast control for luminance, to obtain color and luminance match in the center of the window.

q. Re-check step *n.*

r. Switch the brightness control to the preset position. Adjust the brightness preset control for desired black background.

s. Switch the contrast control to the preset position. Adjust the contrast preset for 20.0 foot Lamberts with the foot Lambert meter at the center of the window.

5.5.3 Requirement

a. As the contrast control is varied from maximum to minimum luminance, the color temperature of the window must not change.

SECTION 6

TROUBLESHOOTING

General

This section provides information for field repair and troubleshooting of the monitor. Test points and components may be located by referring to figures at the back of this section.

Preliminary Checks

a. Check all switch positions.

b. Check all circuit board connectors. Single-pin connectors may become loose through repeated reconnecting. Tension can be restored by compressing the female pin with pliers.

c. Check all power supplies.

d. Check all signal line connectors. Loose coaxial connections may cause intermittent operation.

Troubleshooting Checks

Refer to Table 6-1 for troubleshooting information.

SYMPTOM	CHECK AND PROBABLE CAUSE
No raster	1. AC on 2. Video signal 3. Fuse or breaker 4. 24 volt supply 5. 100 volt supply 6. 200 volt supply 7. High voltage module
Low 24 volt	1. Setting of R75, +24V Adj. (162572-002) 2. Z1, 24 volt regulator (162572-002)
High 24 volt	1. Z1, 24 volt regulator 2. Q5, 2N3055 pass transistor (main frame)
No 24 volt	1. Z1, 24 volt regulator (162572-002) 2. Q5, 2N3055 pass transistor (main frame) 3. CR2, +33V dc bridge (main frame)
High 100 volt	1. Q4, 2N3055 pass transistor (main frame) 2. 24 volt supply
No 100 volt	1. Q4, 2N3055 pass transistor (main frame) 2. CR3, +110V dc bridge (main frame)
High 100 volt	1. Q3, 39983 pass transistor (main frame) 2. 24 volt supply
No 200 volt	1. Q3, 39983 pass transistor (main frame) 2. CR1, +235V dc bridge (main frame)

Table 6-1 Troubleshooting

SYMPTOM	CHECK AND PROBABLE CAUSE
No high voltage	1. Horizontal reference pulse J1-14 or pin 54 (162572-002) 2. Q1, BU208 (106373-001) 3. Q2, 2N3055 pass transistor (106373-001) 4. Feedback regulator circuit (106373-001) 5. Flyback (106373-001) 6. Multiplier (106373-001) 7. R2 (106373-001)
High high voltage	1. Q2, 2N3055 pass transistor (106373-001) 2. Feedback regulator circuit (106373-001) 3. High voltage bleeder (106373-001)
Low high voltage	1. ABL circuit (106373-001) 2. Feedback regulator circuit (106373-001)
No vertical sweep	1. Vertical sync, pin 19 (162572-002) 2. Q4, 2N3904 (162572-002) 3. Q1, 2N3055 (vertical output) (main frame) 4. Deflection yoke
No vertical centering	1. C9, 180μF, 5V
No horizontal sweep	1. Horizontal sync in pin 73 (162572-002) 2. Q11, 39741 (162572-002) 3. Q2, BU208 (horizontal output) (main frame) 4. Q4, 2N3055 (+100 horizontal regulator) (main frame) 5. R85, 5 ohm, 5W
No horizontal centering	1. CR9, CR10, 1N916 (162572-002)
Incorrect demodulation	1. Z2, TAA 530 (162553)
Color missing	1. Z1, 4053 AE (162553) 2. Z4, CD4016 AE (162553) 3. Z1, CA3071 (162553)
No brightness control	1. Z5, CD4007 AE (162553) 2. Q17, 2N3904 (162553) 3. CR7, 1N935 (162553)
No aperture correction	1. Q26, 2N3904 (162553) 2. Q27, 2N3904 (162553)

PARTS LISTS

The following pages contain the complete parts lists for all versions of the 5500 series monitors covered by this manual. The parts lists are organized according to assembly number. These assembly numbers match the corresponding assembly numbers on the schematic diagrams. Since this manual covers several different models of the 5500 series monitors, there are more parts lists than will pertain to any one monitor. Be sure to cross-reference the assembly numbers with the schematic diagrams which pertain to your particular monitor.

NOTE

THE PARTS LISTS CONTAINED IN THIS MANUAL ARE INTENDED TO ASSIST AN ELECTRONIC TECHNICIAN OR BROADCAST ENGINEER IN SELECTING SUITABLE REPLACEMENT PARTS TO EFFECT A SATISFACTORY REPAIR WHEN FAILURE OCCURS AND REPAIR BECOMES NECESSARY. THESE ARE NOT RECOMMENDED SPARES LISTS, AND SHOULD NOT BE USED AS SUCH. RECOMMENDED SPARE PARTS LISTS, FOR USE IN SPARES PROVISIONING, ARE AVAILABLE FROM CONRAC ON REQUEST. THEY ARE NOT INCLUDED AS A PART OF THE MANUAL.

CABINET ASSEMBLY No. 106224

Left Side Handle	183696-001
Right Side Handle	183696-002
Feet	314005
Knob-Cast	314040

FRONT PANEL ASSEMBLY

Front Panel (Mask is molded into it)	183790

RIGHT FRONT CONTROL CHASSIS ASSEMBLY No. 106374

Switch Assembly, PWB-Pushbutton	162607-007
Knob, Satin Anodize .25 I. D. x .62 O. D.	314050-002
Designation Overlay	411239
Lamp, 28 Volt	844169
Lamp, Socket	886212
Lamp, Socket Clip	170325
Lamp, Holder	170323
Lamp, Shield	239462

LEFT FRONT CONTROL CHASSIS ASSEMBLY No. 106375

R12	Potentiometer, 25,000 ohms	928414
R13	Potentiometer, 1,000 ohms	928413
R14	Potentiometer, 1,000 ohms	928413
R15	Potentiometer, 10,000 ohms	928415
R16	Potentiometer, 5 Megohms	928417
S10	Switch Assembly (Power)	844209
S11	Switch Assembly (Degauss)	844208
S14	Switch, Toggle, DPDT (Underscan)	950089
	Miscellaneous	
	Upper Switch Shield	239524
	Lower Switch Shield	239525
	Knob, Satin Insert	314028-002
	Knob, Red Insert	314029-001
	Knob, Blue Insert	314029-002
	Knob, Green Insert	314029-003
	Knob, Satin Anodize Insert .12 I. D.	314029-005
	Designation Panel Overlay, Left Front	411276

TOP ASSEMBLY No. 106376

RT1	Thermister	202980	
CR1	Diode, Bridge, VS447TT	206012	
CR2	Diode, Bridge, VS247	206026	
CR3	Diode, Bridge, VS247	206026	
Q1	Transistor, 2N3055	207155-001	
Q2	Transistor, BU208	207260	
Q3	Transistor, 39983	207119	
Q4, Q5	Transistor, 2N3055	207155-001	
C1	Capacitor, 150 x 20µF, 300V Mallory 211661-235-7550Y [TVLU-2765 (Fistells) 8-83]	211661	SPRAGUE TVL-26
C2	Capacitor, 750 x 100 x 20µF, 125V NOT USED	211766	
C3	Capacitor, 1500µF, 50V	211775-002	
L1A	Coil Degaussing	770362	
L1B	Coil Degaussing	770362	
L3	Coil, Beam Alignment	770377	
DS1	Lamp	844032	
DS2	Lamp	844028	
CB1	Circuit Breaker, 2 Amp.	844214	
J1 to J6	Connector, BNC	886098	
T1	Transformer, Power	965101	
T2	Transformer, Vertical Output	965083	
L2	Deflection Yoke and Purity Magnet Assembly	994095	
	Miscellaneous		
	Socket Transistor	935046-003	
	Socket Transistor	935046-004	
	Connector, Anode	349045	
	Connector, Tally Lamp	886029	
	Connector, Neck	886149	
	Housing, Connector (2 Pin)	886197-002	
	Housing, Connector (3 Pin)	886197-003	
	Housing, Connector (5 Pin)	886197-005	
	Switch, Slide, DPDT	950036-001	
	CRT and Yoke Assembly (Trinitron Type 330AB22)	520171-922	
	Cord, Line	987013-003	

HIGH VOLTAGE MODULE ASSEMBLY No. 106373

R1	Resistor, 8,200 ohms, 10%, 1/2W	202240
R2	Resistor, 150,000 ohms, 10%, 2W	202701
Q1	Transistor, BU208 Silicon NPN (TO-3)	207260
Q2	Transistor, 2N3055 Silicon NPN (TO-3)	207155-001
C1	Capacitor, 1,000 pF, 10kV, 10%	210683-001

HIGH VOLTAGE MODULE ASSEMBLY No. 106373 (Cont.)

T1	Transformer, Flyback	782060
T2	Transformer, Horizontal Convergence	844102
	Miscellaneous	
	Socket Transistor	935046-003
	Socket, 1G3	938001

NECK SOCKET BOARD No. 162482-002

C1, C2	Capacitor, .75pF, 1,000V	210003
C3	Capacitor, .01µF, 1,000V	210914
C4	Capacitor, .75pF, 1,000V	210003
C5	Capacitor, .01µF, 1,000V	210914
C6	Capacitor, .75pF, 1,000V	210003
R1 to R4	Resistor, 1,000 ohms, 1/2W, 10%	201765
R5, R6	Resistor, 100,000 ohms, 1/2W, 10%	202640
R7	Resistor, 1 Megohm, 1/2W, 10%	202865
	Miscellaneous	
	Socket, 8 Pin (Sony No. 1-526-086-21)	935061

VIDEO PROCESSOR No. 162553

C1	Capacitor, .05µF, 100V, +80% -20%	211041
C2	Capacitor, 68pF, 500V, ± 5%	210250
C3	Capacitor, 100pF, 500V, ± 5%	210295
C4	Capacitor, 2.2µF, 20V	211392
C5	Capacitor, 47pF, 500V, ±5%	210195
C6	Capacitor, .05µF, 100V, +80% -20%	211041
C7	Capacitor, .05µF, 100V, +80% -20%	211041
C8	Capacitor, 330pF, 500V, ±5%	210505
C9	Capacitor, 100pF, 500V, ±10%	210291
C10	Capacitor, 1.0µF, 35V	211338
C11	Capacitor, 270pF, 500V, ±5%	210480
C12	Capacitor, 270pF, 500V, ±5%	210480
C13 to C17	Capacitor, .1µF, 75V, +80% -30%	211080
C18	Capacitor, 68µF, 25V, ±20%	211576-001
C19	Capacitor,.01µF, 75V, +80% - 30%	211080
C20	Capacitor, 1.0µF, 35V, ±10%	211340
C21	Capacitor, .01µF, 100V, ± 20%	210869
C22	Capacitor, 5.0µF, 250V	211426
C23	Capacitor, 68pF, 500V, ±5%	210250
C24	Capacitor, .05µF, 100V, +80% -20%	211041
C25	Capacitor, .05µF, 100V, +80% -20%	211041
C26	Capacitor, .1µF, 75V, +80% -30%	211080
C27	Capacitor, 12pF, 500V, ±5%	210075
C28	Capacitor, 47pF, 500V, ±5%	210195
C29	Capacitor, 5.5pF - 18pF	211845
C30	Capacitor, 68pF, 500V, ±5%	210250
C31	Capacitor, 510pF, 500V, ±5%	210588
C32	Capacitor, 10µF, 20V	211443
C34	Capacitor, .05µF, 100V, +80% -20%	211041
C35	Capacitor, .05µF, 100V, +80% -20%	211041
C36	Capacitor, .01µF, 100V, ±20%	210869
C37	Capacitor, 68pF, 500V, ±5%	210240
C38	Capacitor, 47pF, 500V, ±5%	210195
C39	Capacitor, 360pF, 500V, ±5%	210515
C40	Capacitor, .01µF, 100V, ±20%	210869

VIDEO PROCESSOR No. 162553 (Cont.)

C41	Capacitor, .01μF, 100V, ±20%	210869
C42	Capacitor, .05μF, 100V, +80% -20%	211041
C43	Capacitor, 360pF, 500V, ±5%	210515
C44	Capacitor, .05μF, 100V, +80% -20%	211041
C45	Capacitor, .01μF, 100V, ±20%	210869
C46	Capacitor, .1μF, 75V, +80% -30%	211080
C47	Capacitor, 1.0μF, 35V, ±10%	211340
C48	Capacitor, .01μF, 100V, ±20%	210869
C49	Capacitor, 10μF, 20V	211443
C50	Capacitor, 43pF, 500V, ±5%	210180
C51	Capacitor, .1μF, 400V, +80% -20%	211109
C52	Capacitor, 2.0μF, 150V	211375
C53	Capacitor, 10μF, 20V	211443
C54	Capacitor, .1μF, 75V, +80% -30%	211080
C55	Capacitor, 1.0μF, 35V, ±10%	211340
C56	Capacitor, .01μF, 100V, ±20%	210869
C57	Capacitor, 1,000pF, 500V, ±20%	210695
C58	Capacitor, 10μF, 25V	211460
C59	Capacitor, .1μF, 75V, +80% -30%	211080
C60	Capacitor, 270pF, 500V, ±5%	210480
C61	Capacitor, 68μF, 25V, ±20%	211576-001
C62	Capacitor, 10pF, 500V, ±5%	210070
C63	Capacitor, 10pF, 500V, ±5%	210070
C64	Capacitor, 10μF, 20V	211443
C65	Capacitor, 150pF, 500V, ±5%	210375
C66	Capacitor, 100pF, 500V, ±5%	210295
C67	Capacitor, 1,800pF, 500V, ±5%	210735
C68	Capacitor, 68μF, 25V, ±20%	211576-001
C69	Capacitor, 10pF, 500V, ±5%	210065
C70	Capacitor, 300pF, 500V, ±5%	210492
C71	Capacitor, .1μF, 75V, +80% -30%	211080
C72	Capacitor, 70pF - 350pF	211865
C73	Capacitor, .1μF, 75V, +80% -30%	211080
C74	Capacitor, .1μF, 75V, +80% -30%	211080
C75	Capacitor, 270pF, 500V, ±5%	210480
C76	Capacitor, 10μF, 20V	211443
C77	Capacitor, 4.7μF, 25V, ±20%	211404-001
C78	Capacitor, .01μF, 100V, ±20%	210869
C80	Capacitor, 180pF, 500V, ±5%	210405
L1	Coil, 40 μH	770136
L2	Coil, 21.5 μH	770135
L3	Coil, 420 μH	770073
L4	Coil, 72 μH	770366
L5	Coil, 7 μH - 16 μH	770367
L6	Coil, 4 μH - 8 μH	770369
L7	Coil, 420 μH	770073
L8	Coil, 50 μH - 110 μH	770368
L11	Coil, 30 μH, ±10%	770364
L12	Coil, 420 μH	770073
X1	Crystal, 3.575611 MHz	844095
DL1	Delay Line	844149
CR1	Diode, 1N916	206105
CR2	Diode, 1N916	206105
CR3	Diode, 1N916	206105
CR5	Diode, 1N759A, 12V Zener	206101
CR6	Diode, 1N5476A, Varactor	206222-001
CR7	Diode, 1N935, 9.0V Zener	206108

VIDEO PROCESSOR No. 162553 (Cont.)

Z1	Integrated Circuit, CA3071	208002
Z2	Integrated Circuit, TAA630	208004
Z3	Integrated Circuit, CA3070	208003
Z4	Integrated Circuit, CD4016 AE	208099
Z5	Integrated Circuit, CD4007 AE	208098
R1	Potentiometer, 10,000 ohms, ±20%	928380
R12	Potentiometer, 10,000 ohms, ±20%	928380
R28	Potentiometer, 100 ohms, ±10%	928456
R70	Potentiometer, 25,000 ohms, ±20%	928239
R82	Potentiometer, 100 ohms, ±10%	928456
R105	Potentiometer, 50,000 ohms, ±30%	928240
R148	Potentiometer, 100 ohms, ±20%	928236
T1	Transformer, Chroma Bandpass	770422
T2	Transformer, Aperture	770370

Except as listed below, all resistors are 1/4W ±5% and carbon composition. For exact value, see schematic diagram.

R32	Resistor, 10,000 ohms, 3W, ±5%	202290
R33	Resistor, 10 ohms, 1/2W, ±10%	201140
R34	Resistor, 470,000 ohms, 1/4W, ±10%	202808
R35	Resistor, 100,000 ohms, 1/2W, ±1%	202627
R36	Resistor, 6,190 ohms, 1/8W, ±1%	202188
R42	Resistor, 33,000 ohms, 1/2W, ±10%	202485
R43	Resistor, 221,000 ohms, 1/4W, ±1%	202729
R44	Resistor, 274,000 ohms, 1/4W, ±1%	202757
R49	Resistor, 56 ohms, 1/4W, ±10%	201268
R68	Resistor, 2 megohms, 1/4W, ±10%	202888-001
R69	Resistor, 2 megohms, 1/4W, ±10%	202888-001
R74	Resistor, 909 ohms, 1/4W, ±1%	201730
R75	Resistor, 1,000 ohms, 1/4W, ±1%	201750
R76	Resistor, 10 ohms, 1/2W, ±10%	201140
R88	Resistor, 10,000 ohms, 3W, ± 5%	202290
R89	Resistor, 100,000 ohms, 1/2W, ±1%	202627
R90	Resistor, 6,190 ohms, 1/8W, ±1%	202188
R94	Resistor, 10 ohms, 1/2W, ±10%	201140
R104	Resistor, 33,200 ohms, 1/2W, ±1%	202479
R118	Resistor, 10,000 ohms, 3W, ±5%	202290
R119	Resistor, 100,000 ohms, 1/2W, ±1%	202627
R120	Resistor, 6,190 ohms, 1/8W, ±1%	202188
R123	Resistor, 68,000 ohms, 1/4W, ±10%	202569
R131	Resistor, 47 ohms, 1/2W, ±5%	201245
R146	Resistor, 10 ohms, 1/2W, ±10%	201140
R156	Resistor, 2,000 ohms, 1/4W, ±1%	201909
R157	Resistor, 1,000 ohms, 1/4W, ±1%	201750
R159	Resistor, 68,000 ohms, 1/4W, ±10%	202569
R165	Resistor, 820 ohms, 1/2W, ±5%	201700
Q1	Transistor, 2N3906	207228
Q2	Transistor, 2N3904	207227
Q4	Transistor, 2N3906	207228
Q5	Transistor, 2N3904	207227
Q6	Transistor, 2N3904	207227
Q7	Transistor, 39393	207229-002
Q8	Transistor, 2N3904	207227
Q9	Transistor, 2N3904	207227
Q10	Transistor, 2N3053	207150-001
Q11	Transistor, 2N3906	207228
Q12	Transistor, 2N3904	207227
Q13	Transistor, 2N3904	207227

VIDEO PROCESSOR No. 162553 (Cont.)

Q14	Transistor, 39393	207229-002
Q15	Transistor, 2N3906	207228
Q16	Transistor, 2N3904	207227
Q17	Transistor, 2N3904	207227
Q18	Transistor, 2N3906	207228
Q19	Transistor, 2N3904	207227
Q20	Transistor, 2N3904	207227
Q21	Transistor, 39393	207229-002
Q22	Transistor, 2N3904	207227
Q23	Transistor, 2N3565	207175
Q24	Transistor, 2N3904	207227
Q25	Transistor, 2N3904	207227
Q26	Transistor, 2N3904	207227
Q27	Transistor, 2N3904	207227
Q28	Transistor, 2N3904	207227
Q29	Transistor, 2N3904	207227
Q30	Transistor, 2N3906	207228
Q31	Transistor, 2N4265	207232
Q32	Transistor, 2N3906	207228
Q33	Transistor, 2N3904	207227
Q34	Transistor, 2N3906	207228
Q35	Transistor, 2N3904	207227
	Miscellaneous	
	Terminal Wafer (3 Pin)	886147-003
	Terminal Wafer (4 Pin)	886147-004
	Terminal Wafer (3 Pin)	886198-003
	Terminal Wafer (5 Pin)	886198-005
	Terminal Wafer (10 Pin)	886198-010
	Socket, I.C. (14 Pin)	935057
	Socket, I.C. (16 Pin)	935058

MATRIX BOARD No. 162560

C1	Capacitor, 10μF, 20V	211443
Z1	Integrated Circuit, CD4053AE	208100-001
R1	Resistor, 2,000 ohms, 1/8W, ±1%	201908
R2	Resistor, 1,910 ohms, 1/8W, ±1%	201907
R3	Resistor, 2,000 ohms, 1/8W, ±1%	201908
R4	Resistor, 32,400 ohms, 1/8W, ±1%	202477
R5	Resistor, 1,820 ohms, 1/8W, ±1%	201904
R6	Resistor, 154,000 ohms, 1/8W, ±1%	202703
R7	Resistor, 1,300 ohms, 1/8W, ±1%	201832
R8 to R14	Resistor, 2,000 ohms, 1/8W, ±1%	201908
Q1 to Q3	Transistor, 2N3904	207227
	Miscellaneous	
	Connector (3 Pin)	886181-003
	Connector (4 Pin)	886181-004
	Socket, I.C. (16 Pin)	935058

CONTROL BOARD No. 162563

CR1	Diode, PG912	206106
R21, R22, R23	Potentiometer, 200 ohms, ±20%	928410
R24, R25, R26	Potentiometer, 10,000 ohms, ±20%	928455

CONTROL BOARD No. 162563 (Cont.)

R1	Resistor, 8,200 ohms, 1/2W, ±5%	202235
R2	Resistor, 1,300 ohms, 1/2W, ±5%	201835
R3	Resistor, 200 ohms, 1/2W, ±5%	201440
R4	Resistor, 8,200 ohms, 1/2W, ±5%	202235
R5	Resistor, 1,300 ohms, 1/2W, ±5%	201835
R6	Resistor, 200 ohms, 1/2W, ±5%	201440
R7	Resistor, 8,200 ohms, 1/2W, ±5%	202235
R8	Resistor, 1,300 ohms, 1/2W, ±5%	201835
R9	Resistor, 150 ohms, 1/2W, ±5%	201395
S1, 2, 3	Switch, Toggle, SPDT	950086
S4	Switch, Toggle, DPDT	950087
	Miscellaneous	
	Terminal Wafer (3 Pin)	886147-003
	Terminal Wafer (5 Pin)	886147-005

SCAN BOARD No. 162572

C1	Capacitor, 50µF, 25V	211558
C2	Capacitor, 2.7µF, 35V, ±10%	211395
C3	Capacitor, .01µF, 200V, ±10%	210882
C4	Capacitor, 4,700pF, 500V, ±20%	210830
C5	Capacitor, 2.7µF, 35V, ±10%	211395
C6	Capacitor, 1µF, 35V, ±10%	211340
C7	Capacitor, 10µF, 25V	211460
C8	Capacitor, 100µF, 15V	211605-001
C9	Capacitor, 1,000µF, 6.3V	211768
C11	Capacitor, .01µF, 200V, ±10%	210882
C12	Capacitor, .01µF, 200V, ±10%	210882
C13	Capacitor, .18µF, 200V, ±10%	211246-001
C14	Capacitor, .22µF, 100V, ±10%	211248
C15	Capacitor, 1,000pF, 500V, ±10%	210690
C16	Capacitor, 1,000pF, 500V, ±10%	210690
C17	Capacitor, .1µF, 200V, ±10%	211086
C18	Capacitor, .01µF, 200V, ±10%	210882
C20	Capacitor, 1,000pF, 500V, ±10%	210690
C21	Capacitor, 820pF, 300V, ±5%	210635
C22	Capacitor, 1,200pF, 500V, ±5%	210705
C23	Capacitor, .1µF, 200V, ±10%	211086
C24	Capacitor, .1µF, 200V, ±10%	211086
C25	Capacitor, .1µF, 200V, ±10%	211086
C26	Capacitor, 10µF, 50V	211464
C27	Capacitor, .18µF, 200V, ±10%	211246-001
C28	Capacitor, .1µF, 200V, ±10%	211086
C29	Capacitor, 5µF, 6V	211411
C30	Capacitor, 5µF, 6V	211411
C31	Capacitor, 4.7µF, 200V	211412-001
C34	Capacitor, 1µF, 200V, ±10%	211352
C35	Capacitor, 6,800pF, 1,600V, ±10%	210873
C36	Capacitor, 470pF, 500V, ±5%	210555
C37	Capacitor, 470pF, 500V, ±5%	210555
C38	Capacitor, .1µF, 200V, ±10%	211086
C40	Capacitor, 1,000pF, 500V, ±10%	210690
C41	Capacitor, 10µF, 25V	211460
C42	Capacitor, 10µF, 50V	211464
C43	Capacitor, 4,700pF, 500V, ±20%	210830
C45	Capacitor, 4,700pF, 500V, ±20%	210830
C46	Capacitor, .05µF, 500V, +80%-20%	211042-001
C47	Capacitor, .47µF, 200V, ±10%	211314
C48	Capacitor, 2µF, 25V	211365

SCAN BOARD No. 162572 (Cont.)

C49	Capacitor, .022µF, 200V, ±20%	210958
L1	Coil, Pin Phase	770273
L3	Coil, Centering Isolation	770398
L5	Coil, Linearity	770343
L6	Coil, 12µH, ±10%	770374
L7	Coil, 12µH, ±10%	770374
R6	Potentiometer, 50,000 ohms	928240
R9	Potentiometer, 5,000 ohms	928238
R22	Potentiometer, 200 ohms	928400
R43	Potentiometer, 35,000 ohms	928377
R61	Potentiometer, 50 ohms	928399
R75	Potentiometer, 1,500 ohms, 24V	928396
R82	Potentiometer, 5,000 ohms	928238
R94	Potentiometer, 25,000 ohms	928239
R110	Potentiometer, 50 ohms	928399

Except as listed below, all resistors are replaceable by 1/2W ±5% and carbon composition units. For exact value see schematic diagram.

R18	Resistor, 6.2 ohms, 3 W, ±5%	201128
R23	Resistor, 330 ohms, 1W, ±10%	201540
R40	Resistor, 12,000 ohms, 1W, ±10%	202310
R44	Resistor, 56,200 ohms, 1/4W, ±1%	202559
R47	Resistor, 43,200 ohms, 1/4W, ±1%	202519
R49	Resistor, 51,100 ohms, 1/4W, ±1%	202544
R54	Resistor, 18 ohms, 5W, ±10%	201175
R55	Resistor, 2.2 ohms, 2W, ±5%	201074
R56	Resistor, 2.2 ohms, 2W, ±5%	201074
R64	Resistor, 1,500 ohms, 1W, ±10%	201855
R68	Resistor, 68,000 ohms, 2W, ±10%	202585
R70	Resistor, 200,000 ohms, 1/4W, ±1%	202723
R71	Resistor, 28,000 ohms, 1/4W, ±1%	202471
R72	Resistor, .3 ohms, 2W, ±5%	201004
R73	Resistor, 14,700 ohms, 1/4W, ±1%	202344
R74	Resistor, 5,620 ohms, 1/4W, ±1%	202182
R77	Resistor, 1 ohm, 3W, ±10%	201026
R85	Resistor, 5 ohms, 5W, ±5%	201105
R100	Resistor, 3,300 ohms, 3W, ±10%	202036
R102	Resistor, 100 ohms, 1/4W, ±10%	201356
R103	Resistor, 100 ohms, 1/4W, ±10%	201356
R109	Resistor, 2.2 ohms, 3W, ±5%	201078
R111	Resistor, 150 ohms, 1/4W, ±5%	201394
Z1	Integrated Circuit, UA723	208061
T1	Transformer, Pin Modulator	844059
T2	Transformer, Horizontal Drive	965084
T3	Transformer, Horizontal Output	782066
CR1	Diode, 1N916	206105
CR2	Diode, 1N916	206105
CR3	Diode, 1N916	206105
CR4	Diode, 1N916	206105
CR5	Diode, 1N916	206105
CR6	Diode, 1N916	206105
CR7	Diode, 1N916	206105
CR8	Diode, 1N751A, 5.1V	206075
CR9	Diode, 1N916	206105
CR10	Diode, 1N916	206105
CR11	Diode, 1N916	206105

SCAN BOARD No. 162572 (Cont.)

CR12	Diode, 1N916	206105
CR13	Diode, RS372	206009
CR14	Diode, 61299	206184
CR15	Diode, RS372	206009
CR16	Diode, UT783	206063-001
CR17	Diode, 1N4370A, 2.4V	206191
Q1	Transistor, 2N3904	207227
Q2	Transistor, 2N2647	207124
Q3	Transistor, 2N3904	207227
Q4	Transistor, 2N3904	207227
Q5	Transistor, 2N3565	207175
Q6	Transistor, 2N3643	207205
Q7	Transistor, 2N3904	207227
Q8	Transistor, 2N3904	207227
Q9	Transistor, 2N3565	207175
Q10	Transistor, 2N3643	207205
Q11	Transistor, 39741	207231
Q12	Transistor, 39393	207229
Q13	Transistor, 2N3904	207227
Q14	Transistor, 2N3565	207175
Q15	Transistor, 2N3906	207228
Q16	Transistor, 2N3053	207150-001
Q17	Transistor, 39393	207229
Q18	Transistor, 2N3904	207227
	Miscellaneous	
	Terminal Wafer (5 Pin)	886198-005
	Terminal Wafer (10 Pin)	886198-010
	Terminal Wafer (3 Pin)	886198-003
	Socket, I.C. (14 Pin)	935057
	Jumper Assembly (2 Pin)	844167

HIGH VOLTAGE REGULATOR BOARD No. 162573

C1	Capacitor, 4.7μF, 100V	211408
C2	Capacitor, 3,900pF, 1,500V	210811-001
C3	Capacitor, .05μF, 1,600V	211046
C4	Capacitor, 10μF, 150V	211467
C5	Capacitor, 1,000pF, 500V, ±20%	210695
C6	Capacitor, 0.1μF, 200V, ±10%	211086
C7	Capacitor, 1,000pF, 1kV, ±20%	210676
C8	Capacitor, 0.1μF, 200V, ±10%	211086
C9	Capacitor, 470pF, ±10%	210565
C10	Capacitor, .05μF, 500V, +80%-20%	211042-001
CR1, CR2	Diode, RS372	206009
CR3, CR4	Diode, PG912	206106
CR5	Diode, 1N4764A	206197
CR6	Diode, 1N967A	206112
CR7	Diode, PG912	206106
R1	Resistor, 1 ohm, 3W, ±5%	201025
R2	Resistor, 62,000 ohms, ±5%	202565
R3	Resistor, 150,000 ohms, 1/2W, ±10%	202695
R4	Resistor, 3.3 megohms, ±5%	202909
R5	Resistor, 2.2 megohms, ±5%	202895
R7	Resistor, 22,000 ohms, 1/4W, ±10%	202416
R8	Resistor, 10,000 ohms, 1/4W, ±5%	202260
R9	Resistor, 5 ohms, 5W, ±5%	201105
R10	Resistor, 10 ohms, 1/2W, ±10%	201140

HIGH VOLTAGE REGULATOR BOARD No. 162573 (Cont.)

R11	Resistor, 15,000 ohms, 1/4W, ±10%	202348
R12	Resistor, 3,300 ohms 1/4W, ±10%	202020
R13, R14	Resistor, 10,000 ohms, 1/4W, ±5%	202260
R15	Resistor, 330,000 ohms,1/4W, ±10%	202773
R18	Resistor, 2,700 ohms, 1/4W, ±10%	201965
R19	Resistor, 10,000 ohms, 1/4W, ±10%	202275
R20	Resistor, 1,000 ohms, 1/4W, ±10%	201765
R21	Resistor, 47,000 ohms, 1/4W, ±10%	202516
R22	Resistor, 330 ohms, 1/4W, ±10%	201535
R23	Resistor, 3.3 megohms, 1/4W, ±10%	202910
R24	Resistor, 5,600 ohms, 1/4W, ±10%	202160
R25	Resistor, 1 megohm, 1/4W, ±10%	202860
R16	Potentiometer, 500,000 ohms	928368
R17	Potentiometer, 5,000 ohms	928238
Q1	Transistor, 39393	207229
Q2	Transistor, 2N3053	207150-001
Q3	Transistor, 39393	207229
Q4	Transistor, 2N3904	207227
Q6	Transistor, 2N3904	207227
	Miscellaneous	
	Terminal Wafer	886198-003
	Terminal Wafer	886198-005

VIDEO INPUT BOARD No. 162575

C1	Capacitor, 10µF, 15V, ±20%	211445
C2	Capacitor, 10µF, 15V, ±20%	211445
C3	Capacitor, .01µF, 500V, ±20%	210900
C4	Capacitor, .001µF, 500V, ±10%	210690
C5	Capacitor, .001µF, 500V, ±10%	210690
C6	Capacitor, .01µF, 500V, ±20%	210900
C7	Capacitor, .01µF, 500V, ±20%	210900
C8	Capacitor, .1µF, 500V, +80% -20%	211110
C9	Capacitor, 100µF, 15V, ±20%	211605-001
C10	Capacitor, 10µF, 15V, ±20%	211445
C11	Capacitor, .01µF, 500V, ±20%	210900
C12	Capacitor, .01µF, 500V, ±20%	210900
C13	Capacitor, 10µF, 15V, ±20%	211445
C14	Capacitor, 27pF, ±5%	210130
C15	Capacitor, .22µF, 200V, ±10%	211267
C16	Capacitor, .047µF, 200V, ±10%	211044
C17	Capacitor, 150pF, 500V, ±5%	210375
C18	Capacitor, 100µF, 25V, ±20%	211615
C19	Capacitor, 2µF, 15V, ±20%	211360
C21	Capacitor, .022µF, 400V, ±10%	210954
CR1	Diode, 1N756A, 8.2V, ±5%	206091
CR2 - CR10	Diode, PG912	206106

All resistors on this board are replaceable by 1/2W ±5% carbon composition units. For exact values, see schematic diagram.

R36	Potentiometer, 1,000 ohms, ±20%	928237
Q1 - Q7	Transistor, 2N3565	207175
Q8	Transistor, 2N3643	207205
Q9	Transistor, 2N3565	207175
Q10	Transistor, 2N3643	207205

VIDEO INPUT BOARD No. 162575 (Cont.)

Q11	Transistor, 2N3904	207227
Q12	Transistor, 2N3906	207228
	Miscellaneous	
	Connector (Male Pin)	886205
	Connector, Female .062 Diameter	886073
	Connector (3 Pin)	886074
	Connector (3 Pin)	886198-003
	Connector (5 Pin)	886198-005

PAL BOARD No. 162584

C1	Capacitor, 1,000pF, 500V, ±10%	210690
C2	Capacitor, 100,000pF, 100V, ±10%	211085
C3	Capacitor, 150pF, 500V, ±5% (Brazilian)	210375
C3	Capacitor, 180pF, 500V, ±5%(European)	210405
C4	Capacitor, 27pF, 500V, ±5% (European)	210140
C4	Capacitor, 47pF, 500V, ±5% (Brazilian)	210195
C5	Capacitor, 82,000pF, 200V, ±10%	211071
C6	Capacitor, 270,000pF, 100V, ±10%	211294
DL1	Delay Line, 63.943, ±.005µs (European)	844094
DL1	Delay Line, 63.48, ±.005µs (Brazilian)	844096
L1	Coil, Delay Line Input (Brazilian)	770355
L1	Coil, Chroma and Delay Line Matrix (European)	770353
L2	Coil, Chroma and Delay Line Matrix (European)	770353
L2	Coil, Delay Line Output (Brazilian)	770356
L3	Coil, Peaking	770313
R7	Potentiometer, 500 ohms, ±30%	928316
R1	Resistor, 1,000 ohms, 1/2W, ±10%	201765
R2	Resistor, 4,300 ohms, 1/2W, ±5%	202105
R3	Resistor, 9,100 ohms, 1/2W, ±5%	202250
R4	Resistor, 1,500 ohms, 1/2W, ±5%	201845
R5	Resistor, 383 ohms, ±1% (European)	201556
R5	Resistor, 287 ohms, ±1% (Brazilian)	201512
R6	Resistor, 200 ohms, ±5%	201440
R8, R9	Resistor, 180 ohms, ±5%	201415
R10	Resistor, 91 ohms, ±5%	201340
R11	Resistor, 301 ohms, ±1% (Brazilian)	201513
R11	Resistor, 475 ohms, ±1% (European)	201609
R12, R13	Resistor, 15,000 ohms, ±5%	202350
R14, R15	Resistor, 6,800 ohms, ±5%	202200
R16, R17	Resistor, 100 ohms, 1/2W, ±10%	201365
R18	Resistor, 1,000 ohms, ±5%	201760
R19	Resistor, 1,000 ohms, 1/2W, ±10%	201765
R20	Resistor, 470 ohms, 1/2W, ±10%	201595
K1	Relay	904009
Q1	Transistor, 2N3512	207173
Q2 to Q5	Transistor, 2N3565	207175
	Miscellaneous	
	Terminal Wafer	886198-005

PULSE CROSS BOARD No. 162586

C1	Capacitor, 470pF, 500V, ±10%	210555
C2	Capacitor, .001µF, ±10%	211145-102
C3	Capacitor, .0022µF, ±10%	211145-272

PULSE CROSS BOARD No. 162586 (Cont.)

C4	Capacitor, 100μF, 15V, ±10%	211605-001
C5	Capacitor, .001μF, ±10%	211145-102
C6, C7	Capacitor, .1μF, ±10%	211146-103
C8	Capacitor, .1μF, 200V, ±10%	211149-104
C9	Capacitor, 100μF, 15V, ±10%	211605-001
C10	Capacitor, .001μF, ± 10%	211145-102
C11	Capacitor, 5μF, 25V, ±10%	211410
C12	Capacitor, 15μF, 15V, ±10%	211470
CR1	Diode, 1N759A	206101
CR2	Diode, 1N916	206105
CR3	Diode, 1N916	206105
Z1	Integrated Circuit, MC14528CP	208102-001
Z2	Integrated Circuit, MC14011CP	208103-001
Z3	Integrated Circuit, MC14528CP	208102-001

All resistors are replaceable by 1/4W, ±5% and carbon composition units, except as listed below. For exact value, see schematic diagram.

R1	Resistor, 2,700 ohms, 2W, ±5%	201973
R21	Resistor, 10 ohms, 1/2W, ±5%	201332-100
R8	Potentiometer, 50,000 ohms	928444-503
R13	Potentiometer, 250,000 ohms	928490-254
	Miscellaneous	
	Terminal Wafer (10 Pin)	886198-010
	Terminal, Male (1 Pin)	886205
	Socket, I.C., DZP (16 Pin)	935058
	Socket, I.C., DZP (14 Pin)	935057
	Socket, I.C., DZP (16 Pin)	935058

HIGH VOLTAGE DIVIDER BOARD No. 162601

R1 to R10	Resistor, 6.8 megohms, 1/2W, ±10%	202931
R13	Resistor, 470,000 ohms, 1/2W, ±10%	202815
R11	Potentiometer, 10 megohms, ±30% (Converg. Trim)	928397
R12	Potentiometer, 1 megohm, ±20% (G2 Bias)	928242
	Miscellaneous	
	Connector Housing (3 Pin)	886197-003
	Terminal Wafer (3 Pin)	886198-003
	Terminal Wafer (11 Pin)	886198-011
	Terminal, Crimp Style	886145-002

VIDEO INPUT BOARD No. 162654 (Replaces No. 162575 Board)

C1, C2	Capacitor, 10μF, 25V	211460
C4, C5	Capacitor, 15pF, 500V, ±5%	210085
C6, C7	Capacitor, .01μF, 630V, ±10%	211146-103
C8	Capacitor, .1μF, 100V, ±10%	211149-104
C9	Capacitor, 100μF, 15V	211605-001
C10	Capacitor, 10μF, 25V	211460
C11, C12	Capacitor, .01μF, 630V, ±10%	211146-103
C13	Capacitor, 10μF, 25V	211460
C14	Capacitor, 27pF, 500V, ±5%	210130
C15	Capacitor, .22μF, 100V, ±10%	211150-224
C16	Capacitor, .047μF, 250V, ±10%	211148-473
C17	Capacitor, 150pF, 500V, ±5%	210375

VIDEO INPUT BOARD No. 162654 (Replaces No. 162575 Board) (Cont.)

C18	Capacitor, 100μF, 25V	211615
C19	Capacitor, 2μF, 25V	211365
C21	Capacitor, .022μF, 400V, ±10%	211147-223
C22, C23	Capacitor, 5.5 to 18pF Trimmer	211845
CR2 to CR10	Diode, 1N916	206105

Except as listed below, all resistors are replaceable by 1/4W ±5% and carbon composition units. For exact value, see schematic diagram.

R25	Resistor, 1,500 ohms, 1/2W, ±5%	201332-152
R47	Resistor, 560 ohms, 1/2W, ±5%	201332-561
R51	Resistor, 47 ohms, 1/2W, ±5%	201332-470
R36	Potentiometer, 1,000 ohms	928484
Q1 to Q7	Transistor, 2N3565	207175
Q8	Transistor, 2N3643	207205
Q9	Transistor, 2N3565	207175
Q10	Transistor, 2N3643	207205
Q11	Transistor, 2N3904	207227
Q12	Transistor, 2N3906	207228
	Miscellaneous	
	Terminal Wafer (3 Pin)	886198-003
	Terminal Wafer (3 Pin)	886147-003
	Connector Housing	886197-002

VECTOR OUTPUT MODULE

RIGHT FRONT CONTROL CHASSIS ASSEMBLY No. 106382

S1	Rotary Switch	844170
S2	Push-button Switch Assembly	844177
R1	Potentiometer, 250,000 ohms	928409
	Lamp, 28 Volt	844169
	Lamp, Socket	886212

VECTOR DISPLAY BOARD No. 162604

C1	Capacitor, .05μF	211041
C2, C3	Capacitor, 47pF, 500V, ±5%	210195
C4	Capacitor, 220pF, 500V, ±5%	210425
C5, C6	Capacitor, .05μF	211041
C7	Capacitor, 120pF, 500V, ±5%	210345
C8	Capacitor, 150pF, 500V, ±5%	210375
C12	Capacitor, 120pF, 500V, ±5%	210345
C13	Capacitor, 150pF, 500V, ±5%	210375
C20	Capacitor, 180pF, 500V, ±5%	210405
C21 to C26	Capacitor, 270pF, 500V, ±5%	210480
C27, C28	Capacitor, .01μF	210869
C29	Capacitor, 47pF, 500V, ±5%	210195
C30	Capacitor, 62pF, 500V, ±5%	210240
C31, C32	Capacitor, .05μF	211041
C33	Capacitor, 10μF, 20V	211443
C34	Capacitor, .05μF	211041
C35	Capacitor, 5.5 - 18pF	211845
C36	Capacitor, 68pF, 500V, ±5%	210250
C37	Capacitor, .05μF	211041
C38	Capacitor, 1μF, 35V	211338
C39	Capacitor, 470pF, 500V, ±5%	210555
C40	Capacitor, 43pF, 500V, ±5%	210180
C41	Capacitor, 180pF, 500V, N750	210401
C42	Capacitor, 5.5 - 18pF	211845
C43	Capacitor, 470pF, 500V, ±5%	210555
C44, C45	Capacitor, .05μF	211041
C46	Capacitor, 470pF, 500V, ±5%	210555
C47	Capacitor, .05μF	211041
C48	Capacitor, 10pF, 500V, ±5%	210065
C49, C50	Capacitor, 1,000pF, 100V, ±5%	210655
C51 to C54	Capacitor, 10μF, 20V	211443
C55	Capacitor, 68μF, 25V	211576-001
C56	Capacitor, 15pF, 500V, ±5%	210080
L1	Coil, 34-64μH	770136
L2	Coil, 17-33μH	770135
L3, L4	Coil, 3.58 MHz (420μH)	770395
L6	Coil, 18μH	770425
L7 to L11	Coil, 8.2μH	770424
L12	Coil, 47μH	770427
L13	Coil, 13.5-16.5μH	770428
L14	Coil, 5.04-6.16μH	770429
X1	Crystal, 3.58 MHz, Can Type	844181
CR3 to CR15	Diode, PG912	206106
CR16	Diode, 1N756A, 8.2V, ±5%	206091
CR17	Diode, PG912	206106

VECTOR DISPLAY BOARD No. 162604 (Cont.)

Z1	Integrated Circuit, TAA630	208004
Z3	Integrated Circuit, CD4051AE	208107
Z4	Integrated Circuit, CA3070	208003
R4	Potentiometer, 1,000 ohms	928484
R63	Potentiometer, 20,000 ohms	928485

Except as listed below, all resistors are replaceable by 1/4W ±5% and carbon composition units. For exact value, see schematic diagram.

R69	Resistor, 470 ohms, 1/2W, ±5%	201590
R86	Resistor, 1,000 ohms, 1W, ±5%	201770
R88	Resistor, 10 ohms, 1/2W, ±5%	201135
Q1, Q2	Transistor, 2N3904	207227
Q11	Transistor, 2N3904	207227
Q12	Transistor, 2N3053	207150-001
Q13 to Q15	Transistor, 2N3904	207227
Q16	Transistor, 2N3643	207205

VECTOR DISPLAY OPTION BOARD No. 162606

C9	Capacitor, 1µF, 35V	211338
C10, C11	Capacitor, .01µF, ±20%	210869
C14	Capacitor, 1µF, 35V	211338
C15, C16	Capacitor, .01µF, ±20%	210869
C17	Capacitor, 1000pF, 100V, ±5%	210655
C18	Capacitor, .01µF, ±20%	210869
C19	Capacitor, 43pF, 500V, ±5%	210180
C57	Capacitor, 10µF, 20V	211443
L5	Coil, 47µF	770427
CR1, CR2	Diode, PG912	206106
Z2	Integrated Circuit	208097
R19	Potentiometer, 500 ohms	928483
R36	Potentiometer, 500 ohms	928483

All resistors on this board are replaceable by 1/4 W ±5% carbon composition units. For exact values, see schematic diagram.

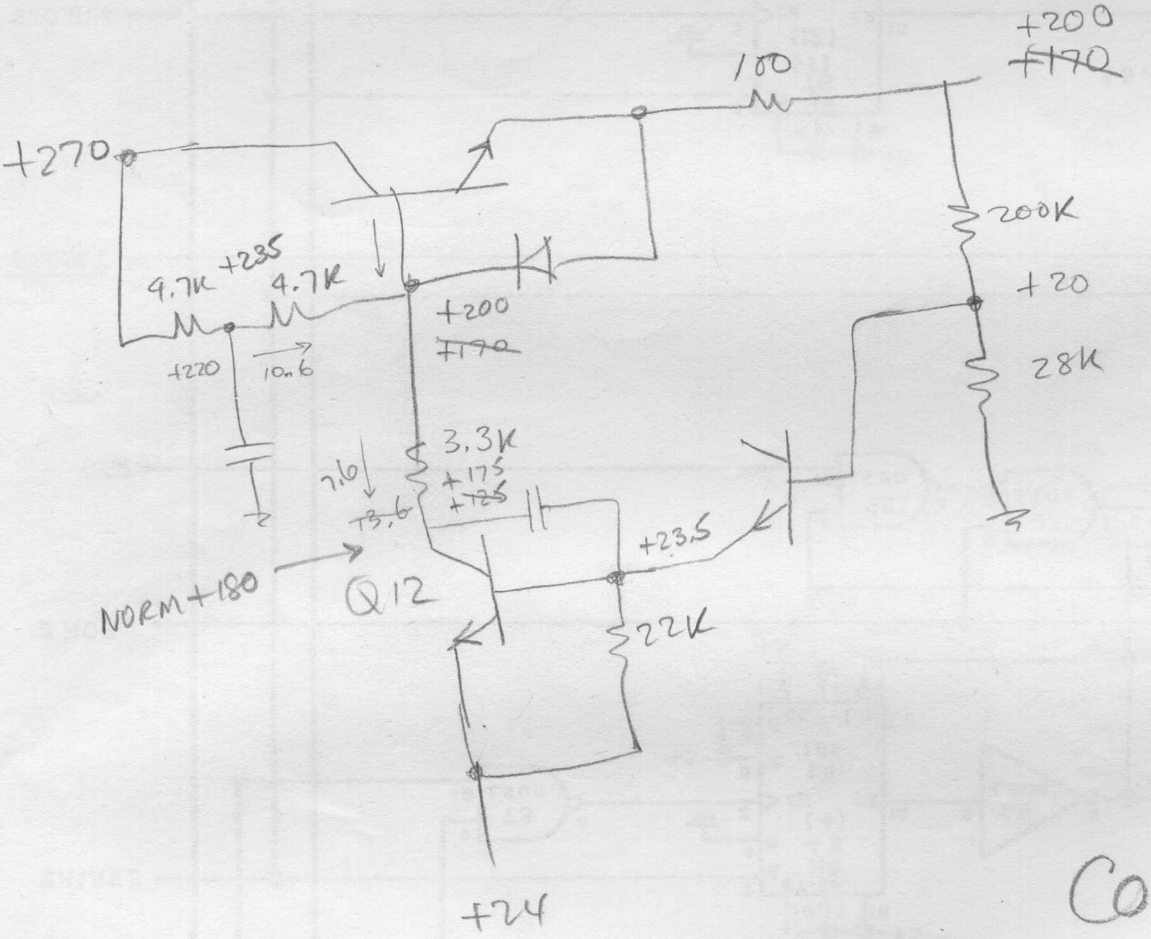
Q3	Transistor, 2N3904	207227
Q4	Transistor, 2N3906	207228
Q5	Transistor, 2N3904	207227
Q6 to Q8	Transistor, 2N4265	207232
Q9	Transistor, 2N3904	207227
Q10	Transistor, 2N3906	207228

Bkg 7.3

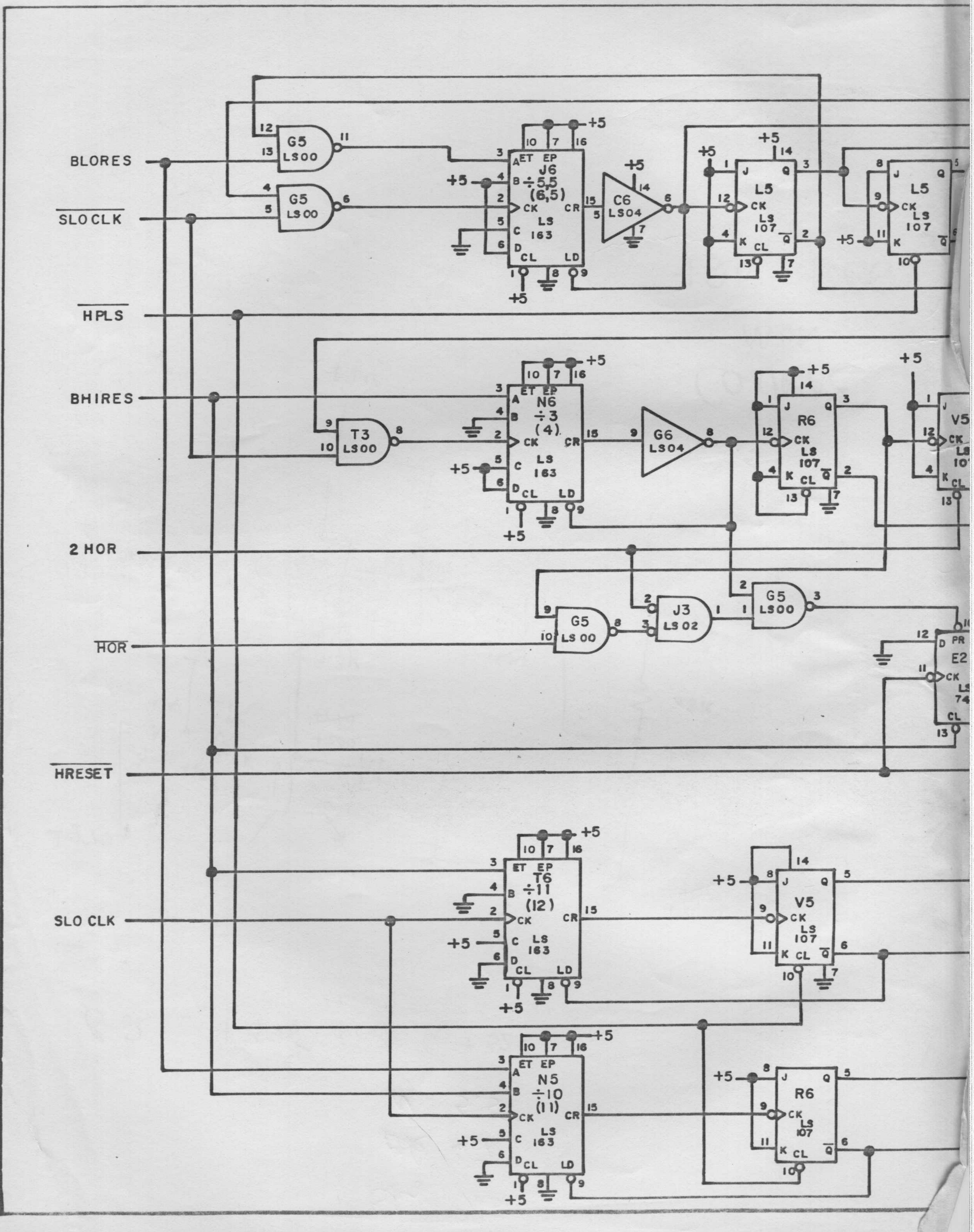
Bk 6.7

W 5.5

G2 +375 drops to +325

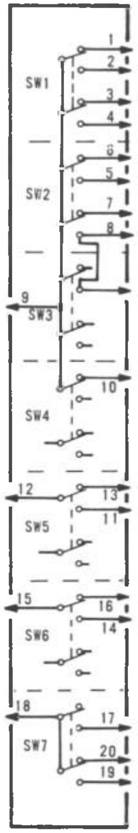


CONRAC
MON.
+200 REG.


BLORES
SLO CLK
HPLS
BHIRES
2 HOR
HOR
HRESET
SLO CLK
G5 LS00
J6 ÷5.5 (6.5) LS 163
C6 LS04
L5 LS 107
T3 LS00
N6 ÷3 (4) LS 163
G6 LS04
R6 LS 107
V5 LS 107
J3 LS02
E2 LS 74
T6 ÷11 (12) LS 163
N5 ÷10 (11) LS 163
+5
ET EP
CK
CR
CL
LD
J
K
Q
D
PR
A
B
C

REV	ECO	DESCRIPTION	DFT	CHKD	APPD	DATE
A		NEW DWG				

162607



ASS'Y DASH NO.		-003	-004	-004	-003	-006	-007	-007	-006	-007	-007
MODEL NO.		RGB STD 5511	MTC STD 5512	PAL STD 5513,14	SECAM STD 5515,16	RGB PROF 5521	NTSC PROF 5522	PAL PROF 5523,24	SECAM PROF 5525,26	NTSC PROF W/VECTOR 5532	PAL PROF W/VECTOR 5533,34
SWITCH MARKING	SW1	——	——	——	——	V-DELAY	V-DELAY	V-DELAY	V-DELAY	V-DELAY	V-DELAY
	SW2	——	——	——	——	H-DELAY	H-DELAY	H-DELAY	H-DELAY	H-DELAY	H-DELAY
	SW3	——	——	——	——	7MS	7MS	7MS	7MS	7MS	7MS
	SW4	H. AFC 0.5MS	H. AFC 0.5MS	H. AFC 0.5 MS	H.AFC 0.5MS	H.AFC 0.5MS	H. AFC 0.5MS	H. AFC 0.5MS	H. AFC 0.5MS	H. AFC 0.5MS	H. AFC 0.5 MS
	SW5	CH.B	CH. B	CH.B	CH. B	CH. B	CH.B	CH.B	CH.B	CH.B	CH. B
	SW6	EXT SYNC	MONO	MONO	MONO	EXT SYNC	MONO	MONO	MONO	MONO	MONO
	SW7	——	NTSC	PAL-S	——	——	NTSC	PAL-S	——	NTSC	PAL-S

162607

QUANTITY/ASSEMBLY | ITEM | PART NUMBER | DESCRIPTION

PRINT DIST		USED ON	NEXT ASSY
1	T	5500/12	
	M		
7B	A		
8A	EC		
9			

TOLERANCES
UNLESS OTHERWISE SPECIFIED
XX ± .03 ANGULAR ±
XXX ± .010 HOLE SIZES ± .005
BREAK SHARP EDGES & DEBURR HOLES
DO NOT TEMPLATE DRAWING

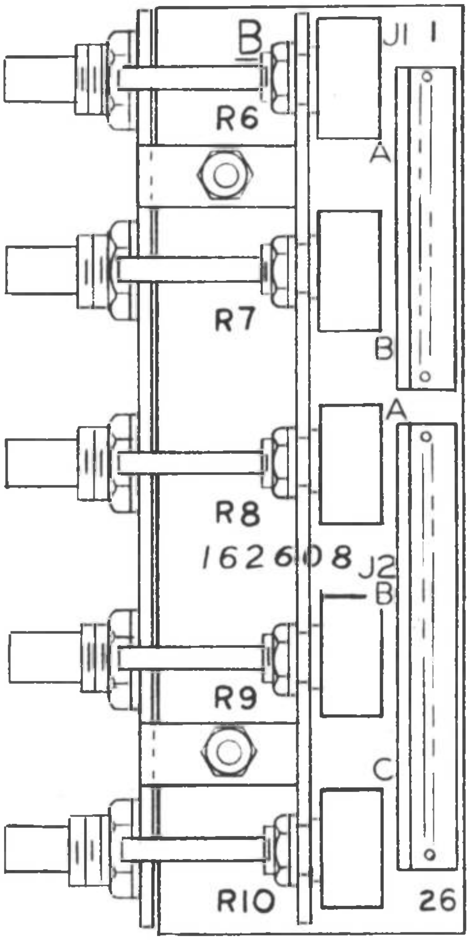
MATERIAL
FINISH
SCALE

CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE
SCHEMATIC
PUSH BUTTON CONTROL BD

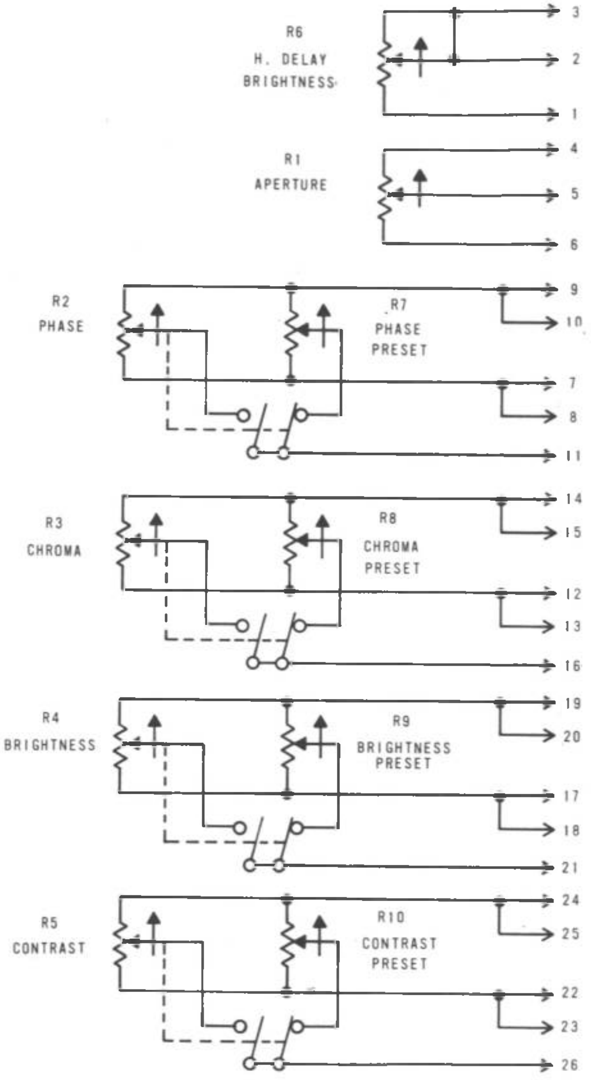
	NAME	DATE
DRAWN BY	E. GEORGE	[illegible]
CHECKED BY		
APPD. ELEC.		
APPD. MECH.		

SIZE C
DWG. NUMBER 162607


B
J1
1
R6
A
R7
B
A
R8
162608
J2
B
R9
C
R10
26

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING	AJS		9-30-74

162608



POT CHART

MODEL	ASS'Y	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
		VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE
PROF NTSC, PAL	-001	500	25K	5K	25K	2K	25K	25K	5K	25K	2K
STD NTSC, PAL	-003	500	25K	5K	25K	2K	—	25K	5K	25K	2K
PROF RGB	-005	—	—	—	2K	2K	25K	—	—	2K	2K
STD RGB	-006	—	—	—	2K	2K	—	—	—	2K	2K

1. ALL POTENTIOMETER VALUES
ARE IN OHMS ± 20%.

NOTES: (UNLESS OTHERWISE SPECIFIED).

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR		USED ON	NEXT DRW
1	7	5500/12	
3	M		
7B	A		
8A	EC		
9			

TOLERANCE
UNLESS OTHERWISE
SPECIFIED
XX ± .03
XXX ± .010
ANGULAR ± 1°

MATERIAL

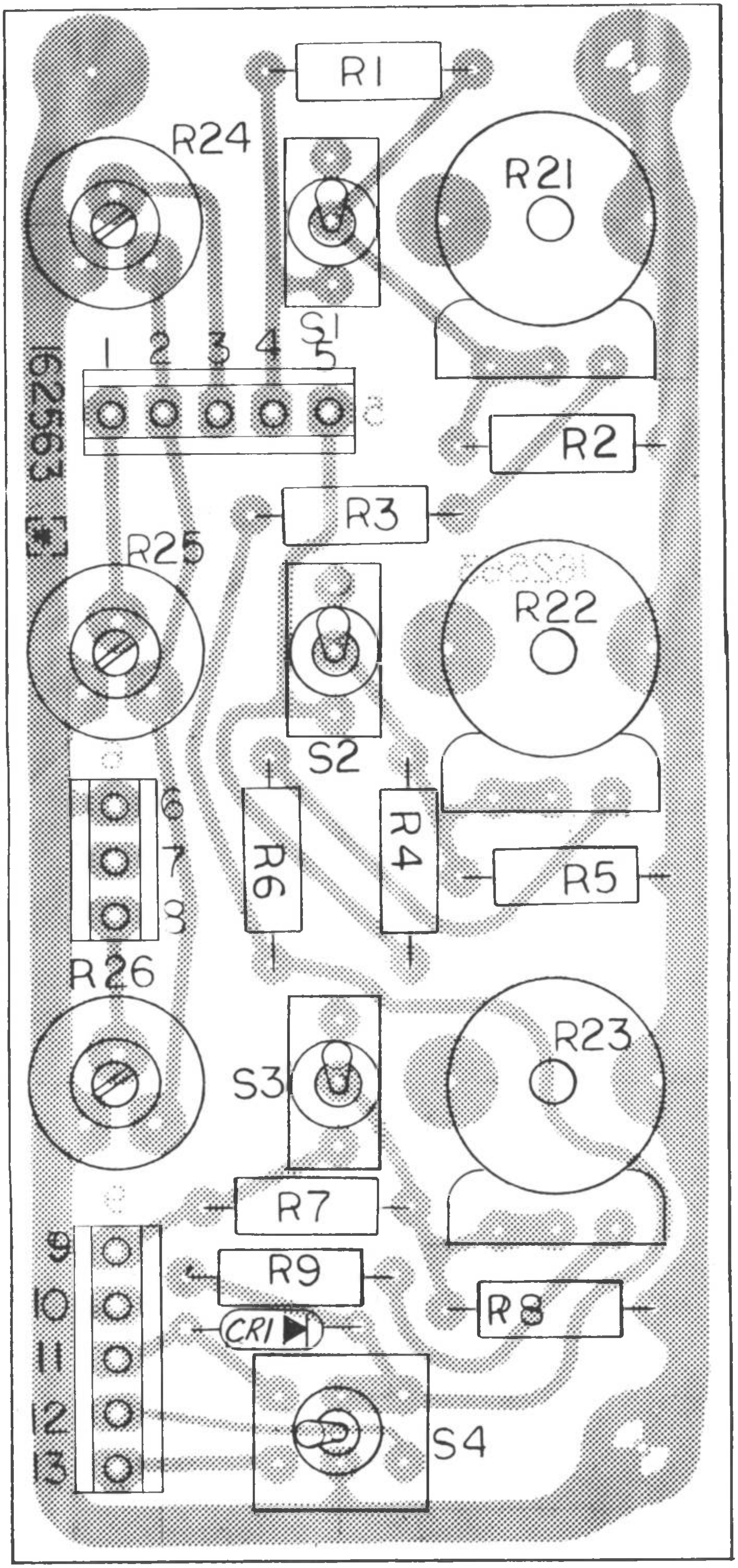
FINISH

CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE
SCHEMATIC, POT CONTROL BOARD

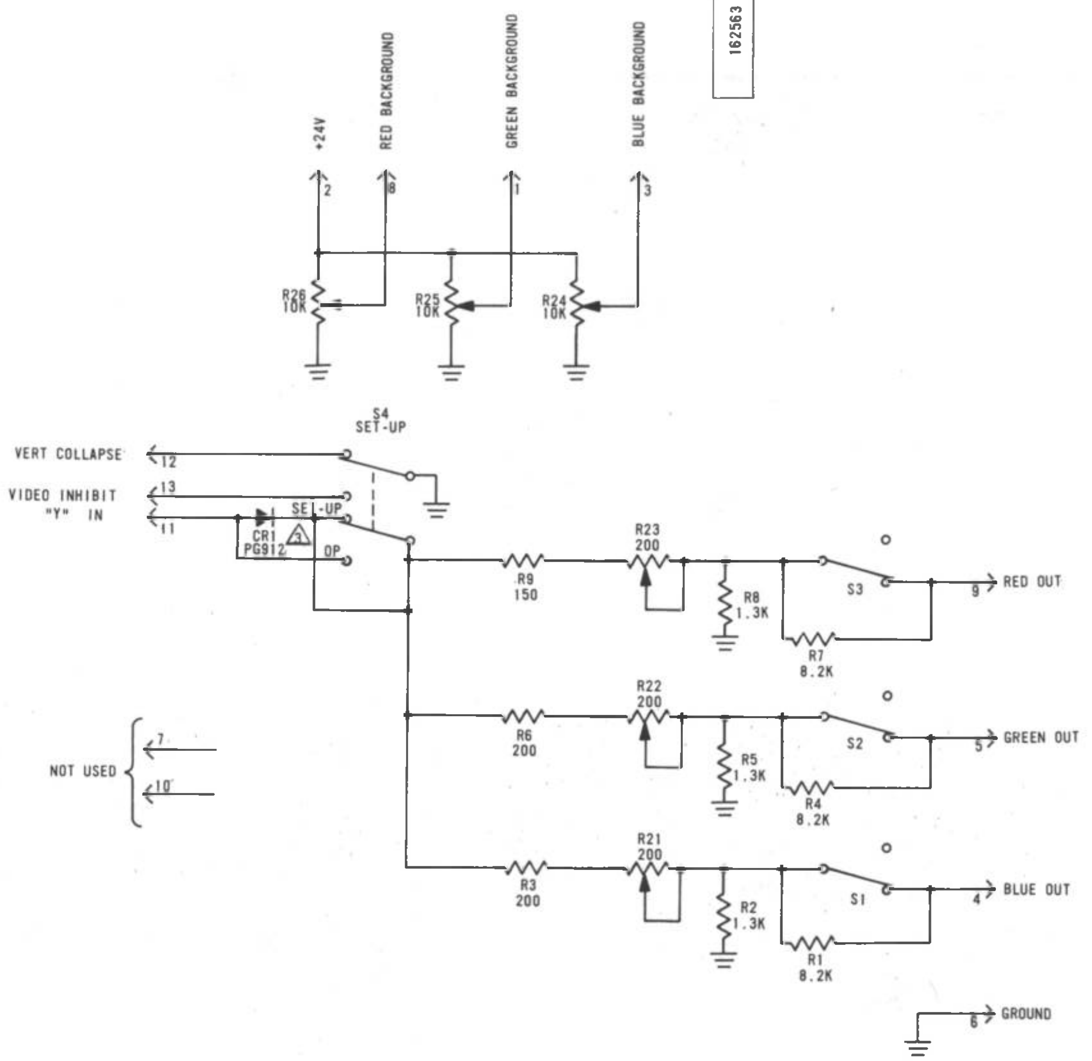
	NAME	DATE
DRAWN BY	J. D. TURNER	3/8/74
CHECKED BY		9-30-74
APPROVED	K. Hagen	10-3-74

PART NUMBER
162608


R1
R24
R21
S1
1
2
3
4
5
162563
R2
R3
R25
R22
S2
6
7
8
R6
R4
R5
R26
R23
S3
R7
9
R9
10
R8
CR1
11
12
S4
13

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			
B	[illegible]	REVERSE POLARITY CR1 REVISED NOTE 3	[illegible]	[illegible]	

162563



162563

NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL SWITCHES ARE 950087, DPDT.
2. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/2W.
3. -001 BOARD CR1 IS NOT USED (NTSC, PAL M AND B)
-002 BOARD CR1 IS USED (RGB AND SECAM)

QUANTITY/ASSEMBLY		ITEM	PART NUMBER	DESCRIPTION
USED ON 5500/12	NEXT DRW	MATERIAL		

DRAWING DISTR.
1
3
4A
7B
8

TOLERANCE
UNLESS OTHERWISE SPECIFIED:
.XX ± .03
.XXX ± .010
ANGULAR: ± 1°

FINISH

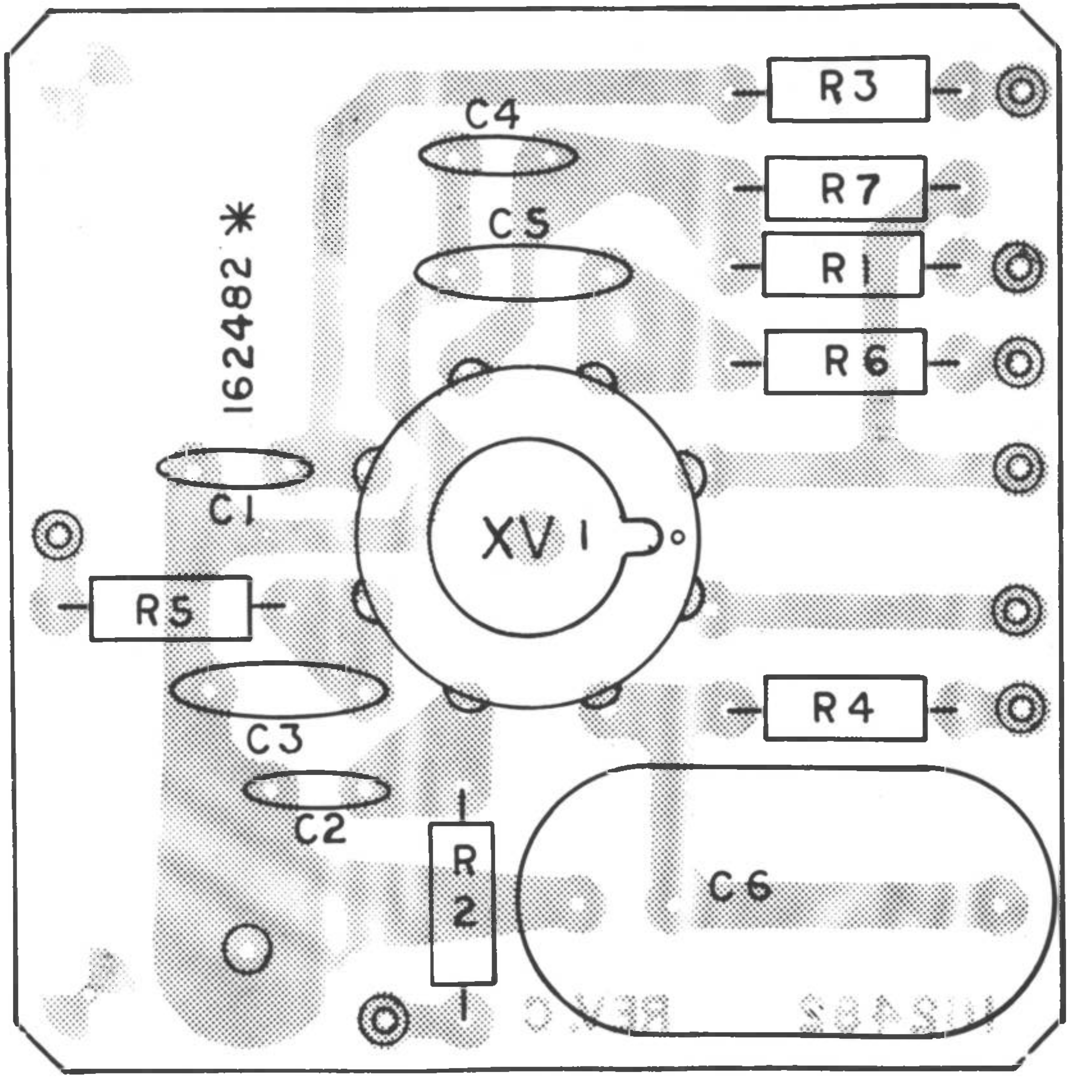
CONRAC

CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE
SCHEMATIC DIAGRAM
CONTROL BOARD

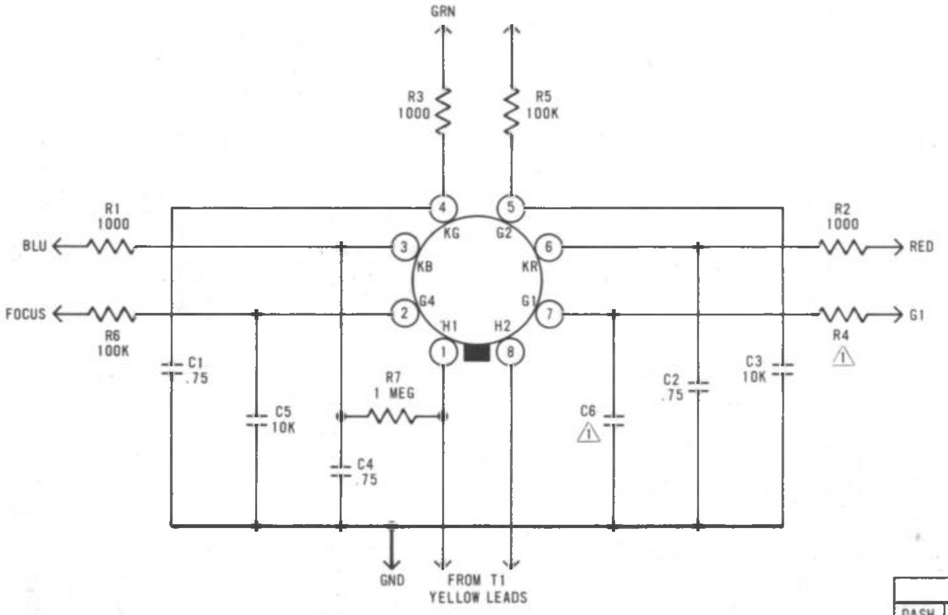
NAME	DATE
DRAWN BY	
CHECKED BY	
APPROVED	

PART NUMBER
162563


R3
C4
R7
C5
R1
162482 ✱
R6
C1
XV1
R5
R4
C3
C2
R2
C6

162482

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A	[illegible]	NEW DRAWING			



162482

⚠ COMPONENT TABLE

DASH NO	UNIT DESIG	COMPONENT VALUE		
		C6	R4	
-001	RGB	.1 UF	47K	
-002	NTSC PALM & B. SECAM 50 & 60	.75	1000	

NOTES:

⚠ FOR COMPONENT VALUES INDICATED, REFER TO COMPONENT TABLE.

2. RESISTOR VALUES ARE IN OHMS, 1/2W, ±10%.

3. CAPACITOR VALUES ARE IN PICOFARADS.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR
3
44
8

USED ON: 3000/5500
NEXT DRW

TOLERANCE
UNLESS OTHERWISE SPECIFIED
XX ± .03
XXX ± .010
ANGULAR ± 1°

MATERIAL

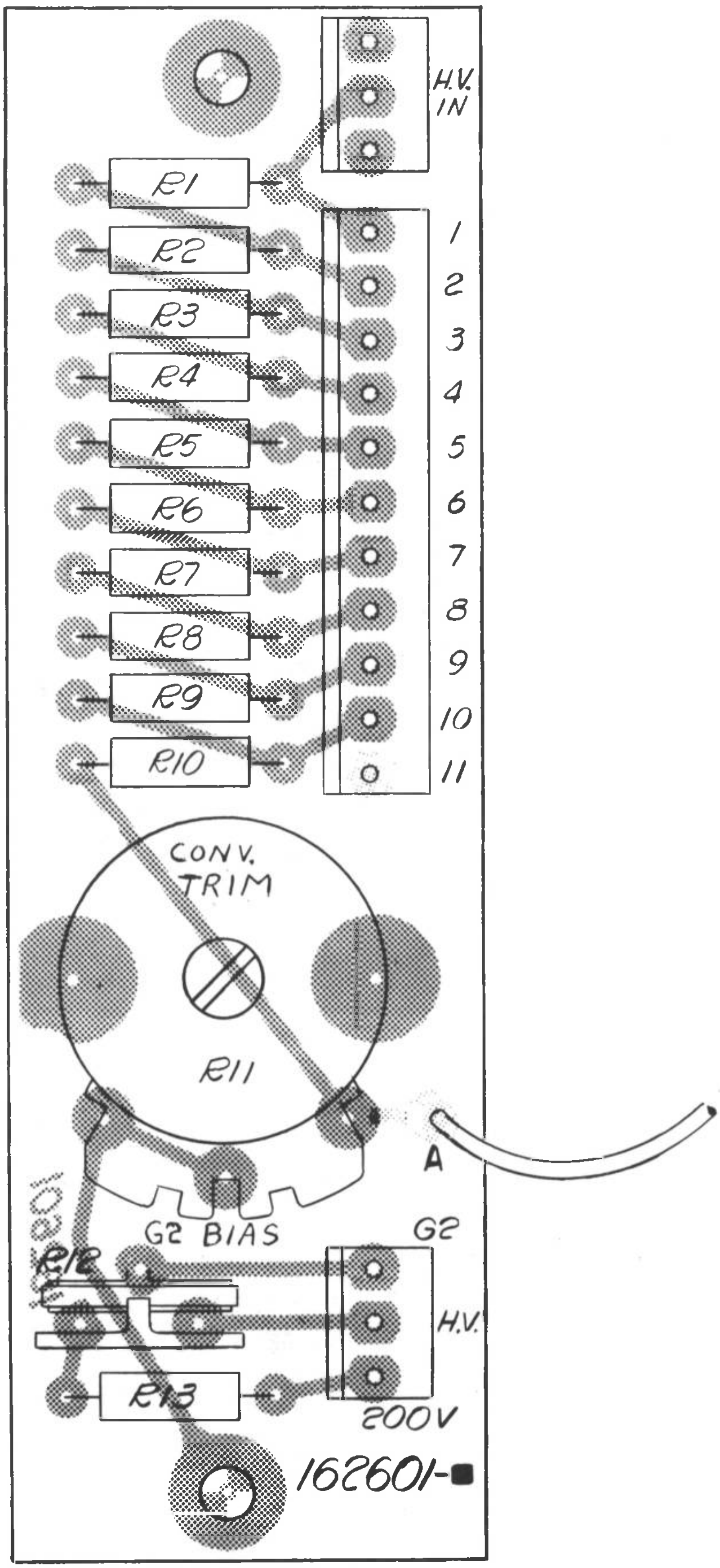
FINISH

CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:
SCHEMATIC
PRINTED WIRING BOARD
NECK SOCKET

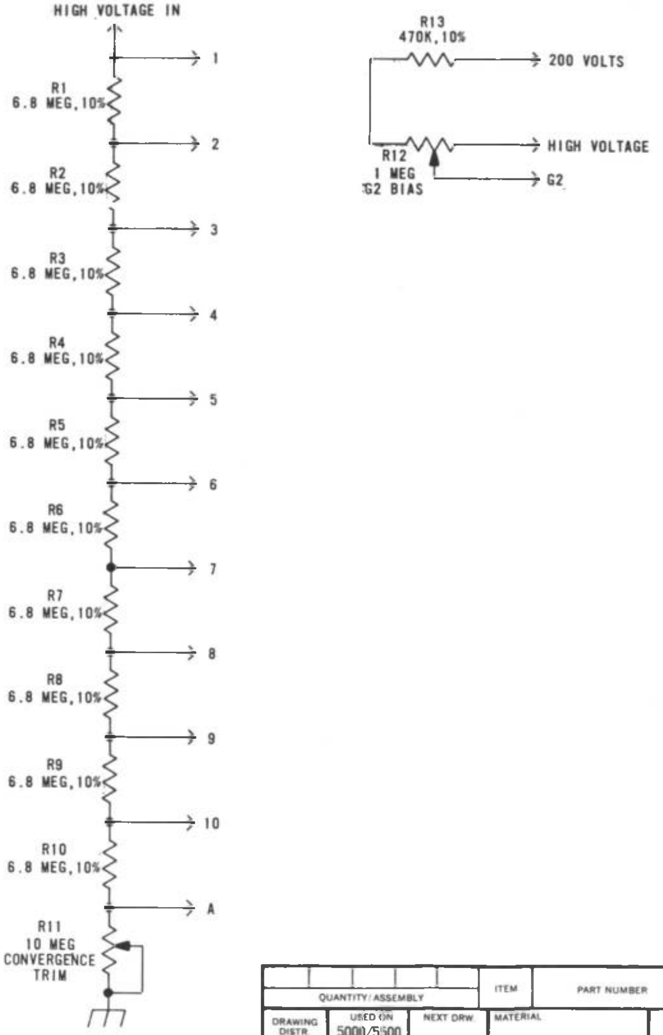
	NAME	DATE
DRAWN BY	J. Cewuder	1-14-74
CHECKED BY		
APPROVED		

PART NUMBER
162482


H.V.
IN
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
1
2
3
4
5
6
7
8
9
10
11
CONV.
TRIM
R11
A
G2 BIAS
G2
R12
H.V.
R13
200V
162601-■

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			2-6-74

162601



162601

NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL RESISTOR VALUES ARE IN OHMS, 1/2W, CARBON COMP.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR.		USED ON	NEXT DRW.
1	9	5000/5500	
3	M		
73	A		
84			
T			

TOLERANCE
UNLESS OTHERWISE SPECIFIED:
.XX ± .03
.XXX ± .010
ANGULAR: ± 1°

MATERIAL

FINISH

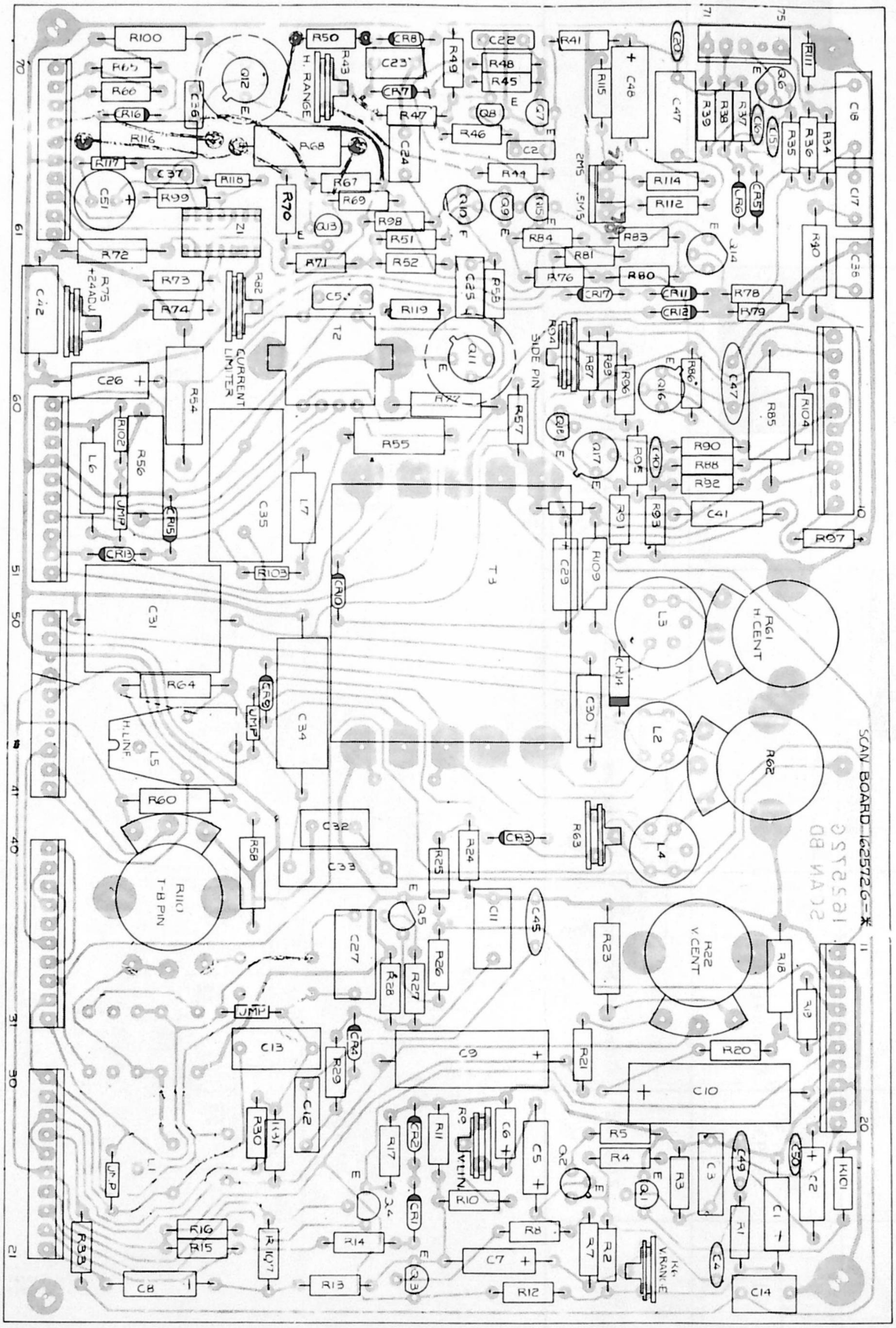
CONRAC

CONRAC DIVISION
CONRAC CORPORATION
800 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:
SCHEMATIC,
PRINTED WIRING BOARD,
HIGH VOLTAGE DIVIDER
5500

	NAME	DATE
DRAWN BY:	J. CRAUDER	1-21-74
CHECKED BY:		2-5-74
APPROVED:		2/7

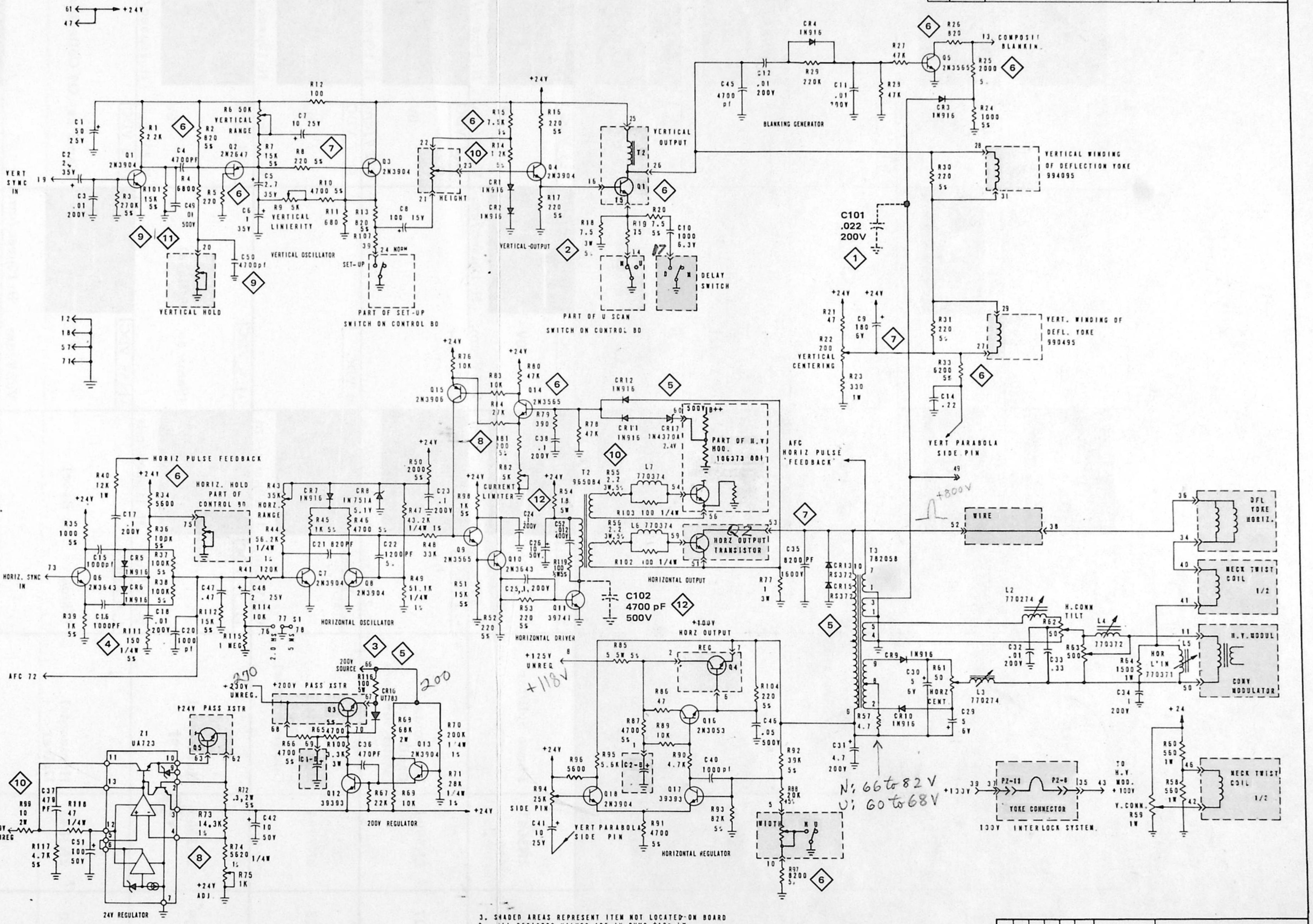
PART NUMBER
162601


SCAN BOARD 1625726-*
SCAN BD
H. RANGE
CURRENT LIMITER
R75 +24 ADJ
H. LINE
T-B PIN
H CENT
V CENT
SIDE PIN
V. LIN
V. RANGE
R100
R65
R66
R16
R116
R117
C37
C51
R99
R118
Z1
R72
R73
R74
R82
C42
C26
R54
R102
R56
L6
JMP
CR15
CR13
C35
L7
R103
C31
R64
CR9
L5
C34
R60
C32
C33
R58
R110
R50
CR8
R43
C23
Q12
C36
R68
R67
R69
R70
Q13
R98
R51
R52
R71
C5
R119
T2
C25
R58
Q11
R77
R55
R57
R49
C22
R48
R45
CR7
R47
C24
Q8
R46
C2
R44
Q10
Q9
Q15
Q7
R41
C20
R115
C48
C47
R114
R112
R84
R81
R83
R76
CR17
R80
CR11
CR12
R78
R79
R94
R87
R89
R96
Q16
R86
R85
R104
Q18
Q17
R95
CR10
R90
R88
R92
R91
R93
C41
R97
T3
C29
R109
L3
R61
CR14
C30
L2
R62
R63
L4
R111
Q6
R39
R38
R37
C16
C15
R35
R36
R34
C18
CR6
CR5
C17
R40
C38
Q14
R34
R25
CR3
C11
C45
Q5
R26
R28
R27
C27
R23
R22
R18
R19
JMP
CR4
C13
R29
C9
R21
R20
C10
C12
R30
R31
R17
CR2
R11
R9
C6
C5
Q2
R5
R4
Q1
R3
C3
C49
C50
C2
R101
C1
R1
L1
JMP
Q4
R10
CR1
R16
R15
R107
R14
R8
R7
R2
R6
C4
C14
R33
C8
R13
Q3
C7
R12
70
61
60
51
50
41
40
31
30
21
71
75
11
20
10
1
E
F

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
K		DELETED C45 ADDED C52 & R118			

CHANGE NOTES

1. C101 WAS PRESENT ONLY ON UNITS BUILT BETWEEN AUGUST, 1974 AND NOVEMBER 1974.
2. R18 WAS ORIGINALLY 7.5 OHM, 3W. CHANGED TO 10 OHM, 5W IN JUNE, 1975 AND CHANGED BACK TO 7.5 OHM IN APRIL, 1976.
3. R116 WAS NOT PRESENT PRIOR TO AUGUST, 1974. ANODE OF CR16 AND EMITTER OF Q3 WERE DIRECTLY TIED TO +200V. R116 WAS ADDED IN AUGUST, 1974 AND WAS 150 OHM, ½ WATT. IT WAS CHANGED TO 100 OHM, 5 WATT IN JULY, 1976.
4. R111 IS PRESENT ONLY IN 162572-002, USED IN NTSC AND PAL MONITORS. IN 162572-003, USED IN RGB MONITORS, THE BOTTOM END OF C18 IS DIRECTLY GROUNDED.
5. DIODES CR15, CR16 AND CR17 WERE ADDED IN AUGUST, 1974. PREVIOUSLY, CR13 WAS ALONE, AND ANODE OF CR11 TIED DIRECTLY TO TERMINAL 60.
6. PRIOR TO AUGUST, 1974: R15 AND R97 WERE 8.2K, 10%. R2 WAS 220 OHMS. R4 WAS 3.3K. R19 WAS 10%. R26 WAS 1K. R25 WAS 5.1K. R33 WAS 10%. R34 WAS 10%. R54 WAS 47 OHMS, 2W, 10%. R102 AND R103 WERE ½ W. R109 WAS 2W. Q2 WAS TYPE 2N2646. Q14 WAS TYPE 2N3643.
7. PRIOR TO NOVEMBER, 1974: C35 WAS 6800 pF. R10 WAS 2K. C9 WAS 250 MICROFARAD.
8. PRIOR TO FEBRUARY, 1975: R84 WAS 39K. R81 WAS 2.2K. R73 WAS 14.7K. R75 WAS 1.5K.
9. PRIOR TO MARCH, 1975: C50 WAS NOT PRESENT. C49 WAS NOT PRESENT.
10. PRIOR TO JUNE, 1975: R99 WAS ½ WATT. R55 AND R56 WERE 2 WATT. R14 WAS 1K.
11. PRIOR TO APRIL, 1976: R5 WAS 10 OHMS.
12. PRIOR TO JULY, 1976: C51 and R118 WERE NOT PRESENT AND C102, NOW DELETED WAS PRESENT.



3. SHADED AREAS REPRESENT ITEM NOT LOCATED ON BOARD
2. ALL RESISTOR VALUES ARE IN OHMS ±10% ½W
1. ALL CAPACITOR VALUES ARE IN MICROFARADS ±10%
NOTES: UNLESS OTHERWISE SPECIFIED

QUANTITY/ASSEMBLY
ITEM
PART NUMBER
DESCRIPTION
5500
TOLERANCE UNLESS OTHERWISE SPECIFIED
MATERIAL
FINISH

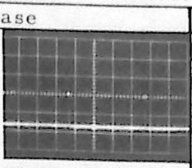
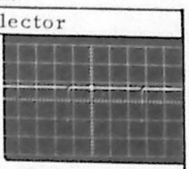
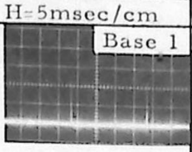
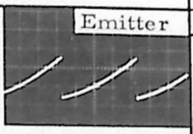
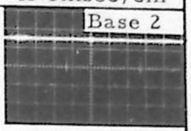
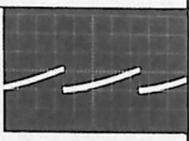
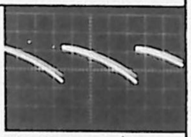
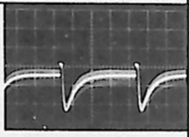
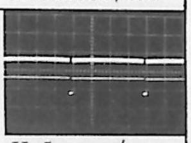
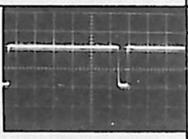
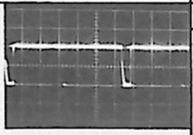
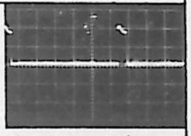
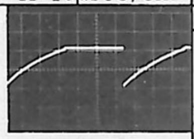
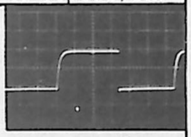
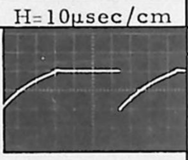
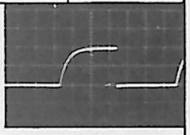
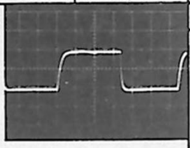
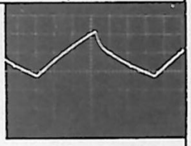
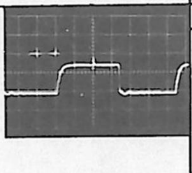
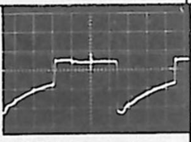
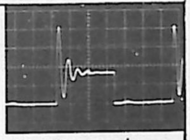
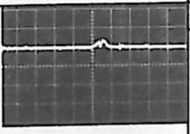
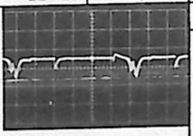
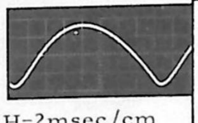
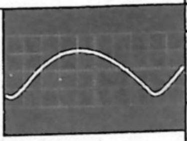
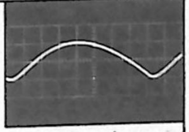
CONRAC

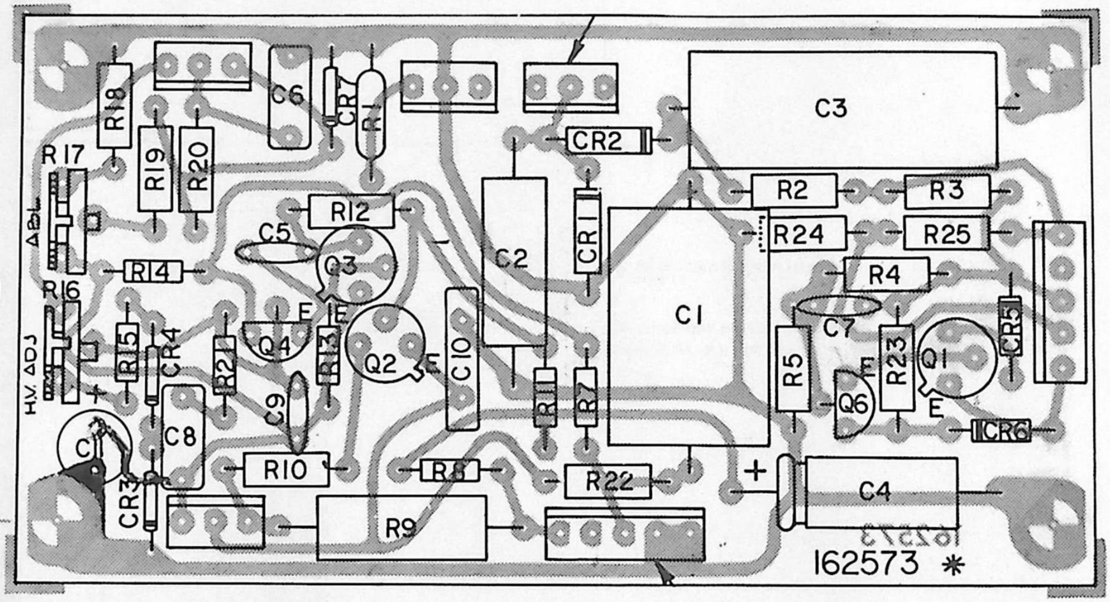
SCHEMATIC DIAGRAM
SCAN BOARD

162572

SCAN BOARD 162572

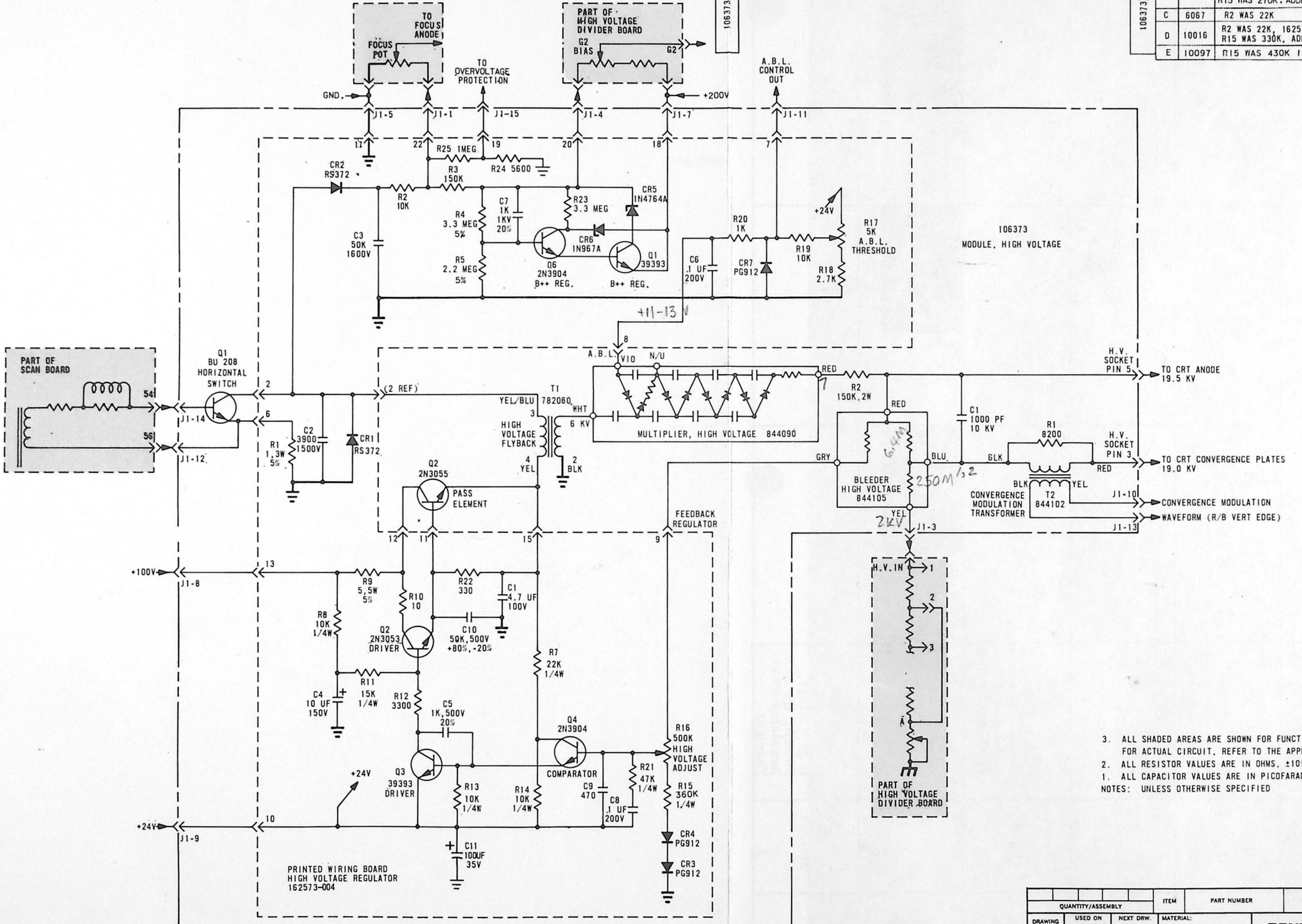
TEST CONDITIONS: Standard Color Bar Test Pattern. DC Voltages taken with Simpson-Type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3904	Vertical Sync Amplifier	-8.0 VDC  0V– V=5V/cm, H=5msec/cm	0 VDC	+8.8 VDC  0V– V=5V/cm, H=5msec/cm
Q2	2N2647 Unijunction	Vertical Oscillator	+.1 VDC  0V– V=2V/cm, H=5msec/cm	+7 VDC  0V– V 2V/cm, H=5msec/cm	+20 VDC  0V– V=5V/cm, H=5msec/cm
Q3	2N3904	Vertical Sync Emitter Follower	+7.0 VDC (Same as Q2 Emitter)	+6.5 VDC (Same as Q2 Emitter)	+24 VDC
Q4	2N3904	Emitter Follower	+3.6 VDC  0V– V=5V/cm, H=5msec/cm	+3.0 VDC (Same as Q1 Base on Chassis)	+19.5 VDC  0V– V=5V/cm, H=5msec/cm
Q5	2N3565	Vertical Blanking Generator	-.4 VDC  0V– V=2V/cm, H 5msec/cm	0 VDC	+17 VDC  0V– V=2V/cm, H=5msec/cm
Q6	2N3643	Phase Splitter	+11.8 VDC  0V– V=5V/cm, H=10µsec/cm	+11 VDC  0V– V=5V/cm, H=10µsec/cm	+13 VDC  0V– V 5V/cm, H=10µsec/cm
Q7	2N3904	Horizontal Oscillator (Multivibrator)	-.1 VDC 0V–  V=2V/cm, H=10µsec/cm	0 VDC	+2.2 VDC  0V– V=2V/cm, H=10µsec/cm
Q8	2N3904	Horizontal Oscillator (Multivibrator)	-.1 VDC 0V–  V=2V/cm, H=10µsec/cm	0 VDC	+1.7 VDC  0V– V=2V/cm, H=10µsec/cm
Q9	2N3565	Horizontal Driver	+1.35 VDC  0V– V=2V/cm, H=10µsec/cm	+1.9 VDC (Same as Q9 Base)	+8.3 VDC  0V– V=2V/cm, H=10µsec/cm
Q10	2N3643	Horizontal Driver	1.9 VDC (Same as Q9 Base)	+1.55 VDC  0V– V=2V/cm, H=10µsec/cm	+8.3 VDC (Same as Q9 Collector)
Q11	39741	Driver	-.2 VDC  0V– V=1V/cm, H=10µsec/cm	0 VDC	+23.5 VDC  0V– 20 V=2V/cm, H=10µsec/cm
Q12	39393	Driver	+24.3 VDC	+24 VDC	+190 VDC
Q13	2N3904	Comparator	+24.8 VDC	+24.3 VDC	+46 VDC
Q14	2N3565	Hysteresis Amplifier	+2.0 VDC  0V– V=.5V/cm, H=10µsec/cm	+1.75 VDC	+23 VDC
Q15	2N3906	Protector Switch	+22.6 VDC 22V–  V=.5V/cm, H=10µsec/cm	+18 VDC	+1.35 VDC
Q16	2N3053	Driver	+75 VDC 80V–  V=2V/cm, H=2msec/cm	+75 VDC (Same as Q16 Base)	+110 VDC
Q17	39393	Comparator	+24 VDC	+23 VDC 24V–  V=1V/cm, H=2msec/cm	+63 VDC 60V–  V=5V/cm, H=2msec/cm
Q18	2N3904	Current Source	+23.5 VDC (Same as Q17 Emitter)	+23 VDC (Same as Q17 Emitter)	+42 VDC


R18
C6
CR7
R1
C3
CR2
R17
R19
R20
ADJ
R12
R2
R3
C5
R24
R25
C2
CR1
R14
Q3
R4
R16
C1
C7
E
E
CR5
Q4
R13
R21
R15
CR4
Q2
E
C10
R23
Q1
R5
H.V. ADJ
+
C8
C9
R11
R7
Q6
E
E
CR6
C1
R10
R8
R22
+
C4
CR3
R9
162573 *

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			
B	5521	162573-002 WAS-001. C2 WAS 470. R15 WAS 270K. ADDED R24 AND R25			
C	6067	R2 WAS 22K			
D	10016	R2 WAS 22K, 162573-004 WAS-002, R15 WAS 330K, ADDED C11, 100MFD			
E	10097	R15 WAS 430K 1/4W			

106373



3. ALL SHADED AREAS ARE SHOWN FOR FUNCTIONAL REPRESENTATION ONLY. FOR ACTUAL CIRCUIT, REFER TO THE APPROPRIATE SCHEMATIC.
2. ALL RESISTOR VALUES ARE IN OHMS, ±10%, 1/2W.
1. ALL CAPACITOR VALUES ARE IN PICOFARADS.
NOTES: UNLESS OTHERWISE SPECIFIED

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR.		USED ON	NEXT DRW.
1	T	5500	
3	M		
7B	A		
8A			
9			

TOLERANCE UNLESS OTHERWISE SPECIFIED:
.XX ± .03
.XXX ± .010
ANGULAR: ± 1°

MATERIAL:

FINISH

CONRAC

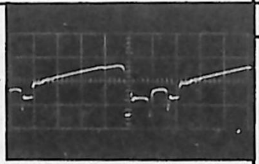
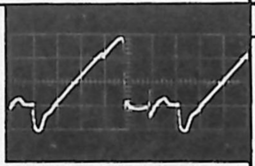
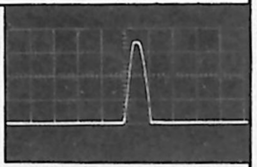
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

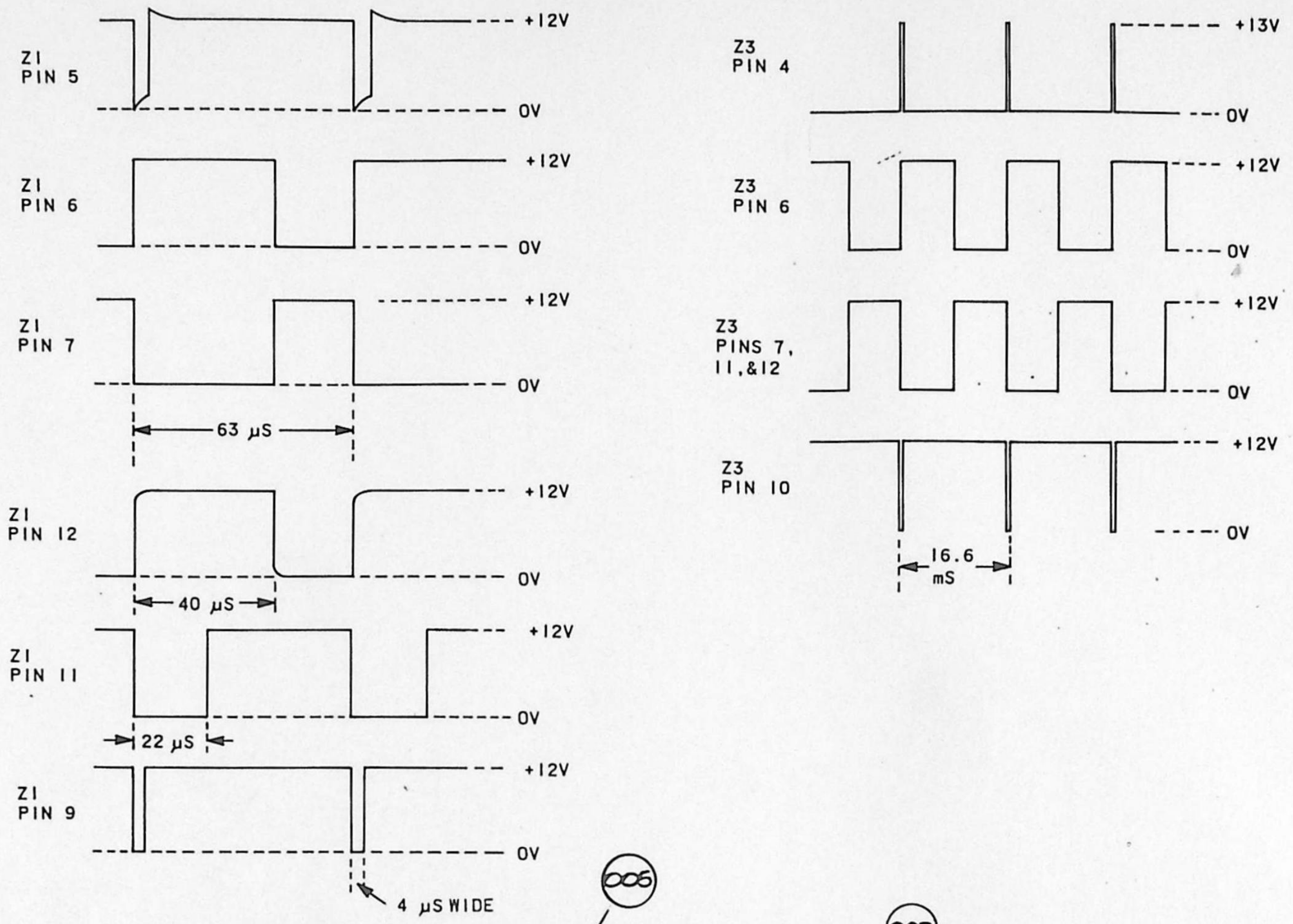
TITLE:
SCHEMATIC
MODULE, HIGH VOLTAGE

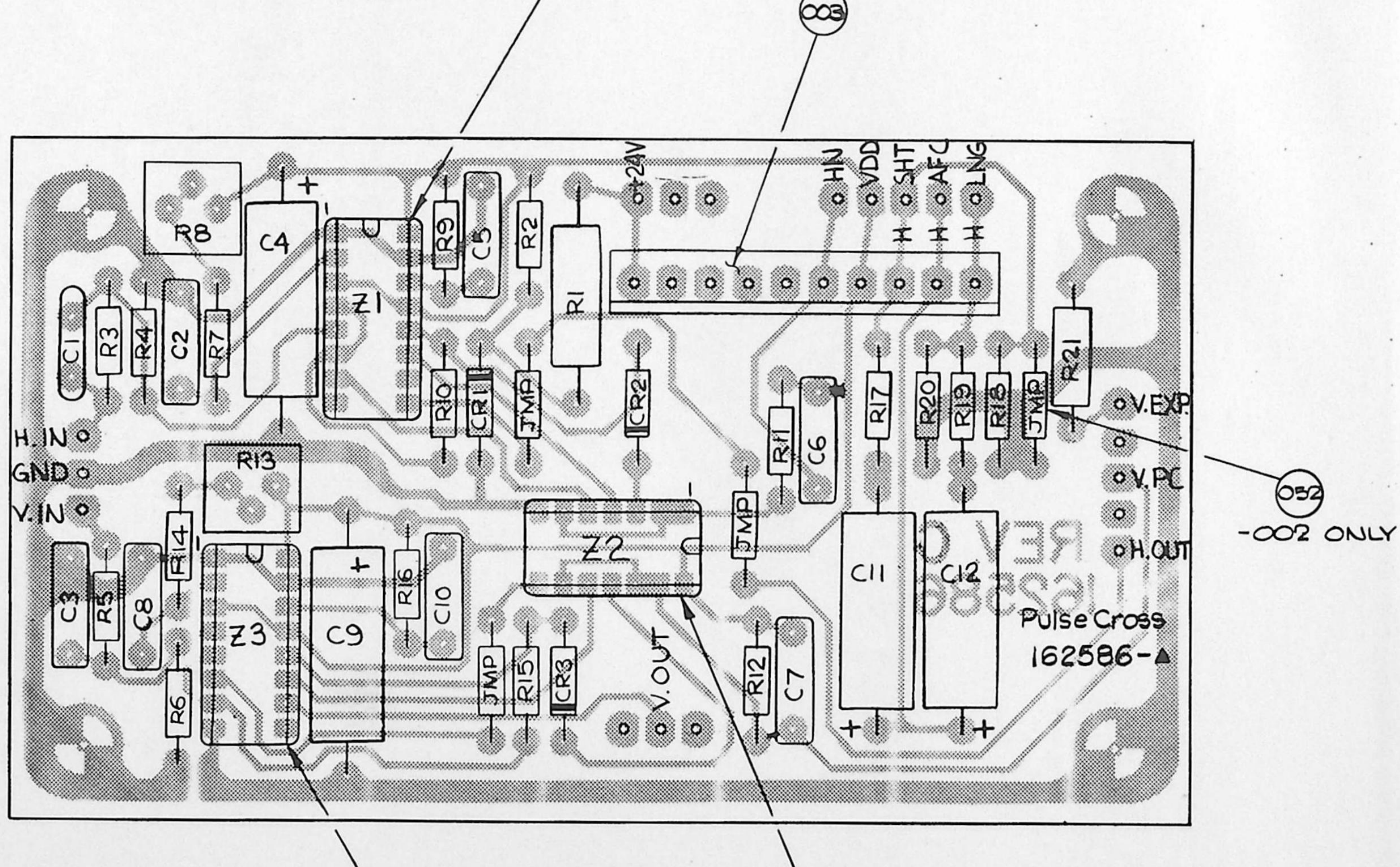
	NAME	DATE
DRAWN BY:	J. Cedviser	1-25-73
CHECKED BY:		
APPROVED:		

PART NUMBER
106373

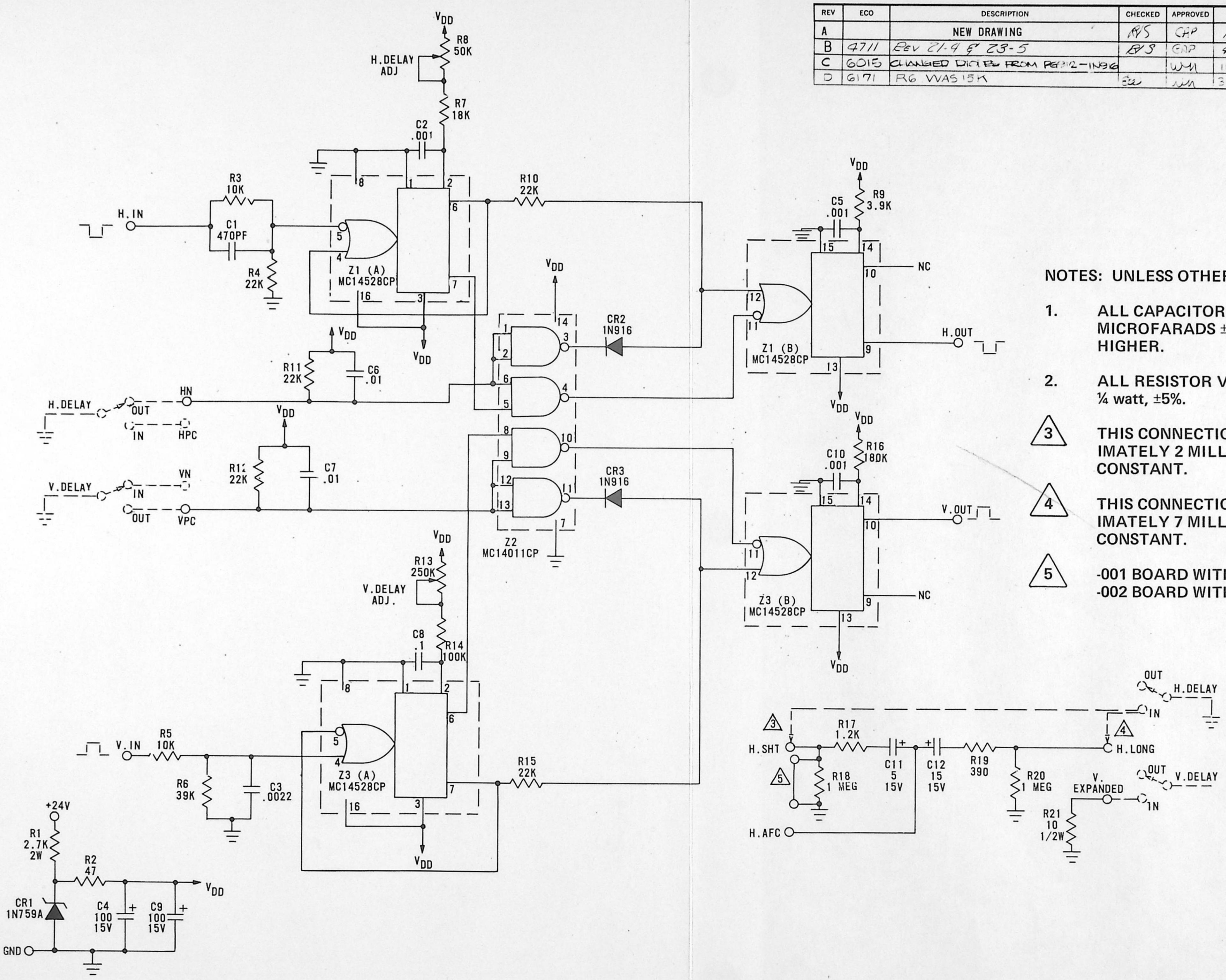
HIGH VOLTAGE MODULE No. 106373

Symbol	Type	Function	Base	Emitter	Collector
High Voltage Regulator Board #162573-2			206 VDC	205 VDC	410 VDC
Q1	39393	G2 Supply Regulator, Pass Element			
Q2	2N3053	G2 Supply Regulator Comparator	82 VDC	80 VDC	105 VDC
Q3	39393	High Voltage Switch, B+ Regulator Driver	24.6 VDC	24.0 VDC	75.0 VDC
Q4	2N3904	High Voltage Switch, B+ Regulator Comparator	25.2 VDC	24.6 VDC	43.0 VDC
Q6	2N3904	High Voltage Switch, B+ Regulator Feedback Driver	182 VDC	206 VDC	225 VDC
CHASSIS:					
1	BU208	High Voltage Switch	-0.2 VDC 54  V=5V/cm, H=10µsec/cm	0.6 VDC 56  V=1V/cm, H=10µsec/cm	CAUTION: Do not measure DC  V=200V/cm, H=10µsec/cm
2	2N3055	High Voltage Switch, B+ Regulator Pass Element	80 VDC	79 VDC	105 VDC


Z1 PIN 5
+12V
0V
Z1 PIN 6
+12V
0V
Z1 PIN 7
+12V
0V
63 µS
Z1 PIN 12
+12V
0V
40 µS
Z1 PIN 11
+12V
0V
22 µS
Z1 PIN 9
+12V
0V
4 µS WIDE
Z3 PIN 4
+13V
0V
Z3 PIN 6
+12V
0V
Z3 PINS 7, 11, & 12
+12V
0V
Z3 PIN 10
+12V
0V
16.6 mS


005
003
052
-002 ONLY
005
006
H. IN
GND
V. IN
+24V
HN
VDD
SHT
AFC
LNG
V. EXP.
V. PC
H. OUT
V. OUT
R8
C4
Z1
R9
C5
R2
R1
C1
R3
R4
C2
R7
R10
CR1
JMP
CR2
R17
R20
R19
R18
JMP
R21
R11
C6
R13
R14
C3
R5
C8
Z3
C9
R16
C10
Z2
JMP
C11
C12
JMP
R15
CR3
R12
C7
R6
REV C
162586
Pulse Cross
162586-▲

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING	R/S	CAP	1-11-74
B	4711	REV Z1-4 & Z3-5	B/S	CAP	4-10-74
C	6015	CHANGED DIODES FROM PG312-1N916		WM	11-3-75
D	6171	R6 WAS 15K		WM	3-24-76



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS ±10%, 100 VOLT OR HIGHER.

2. ALL RESISTOR VALUES ARE IN OHMS, ¼ watt, ±5%.

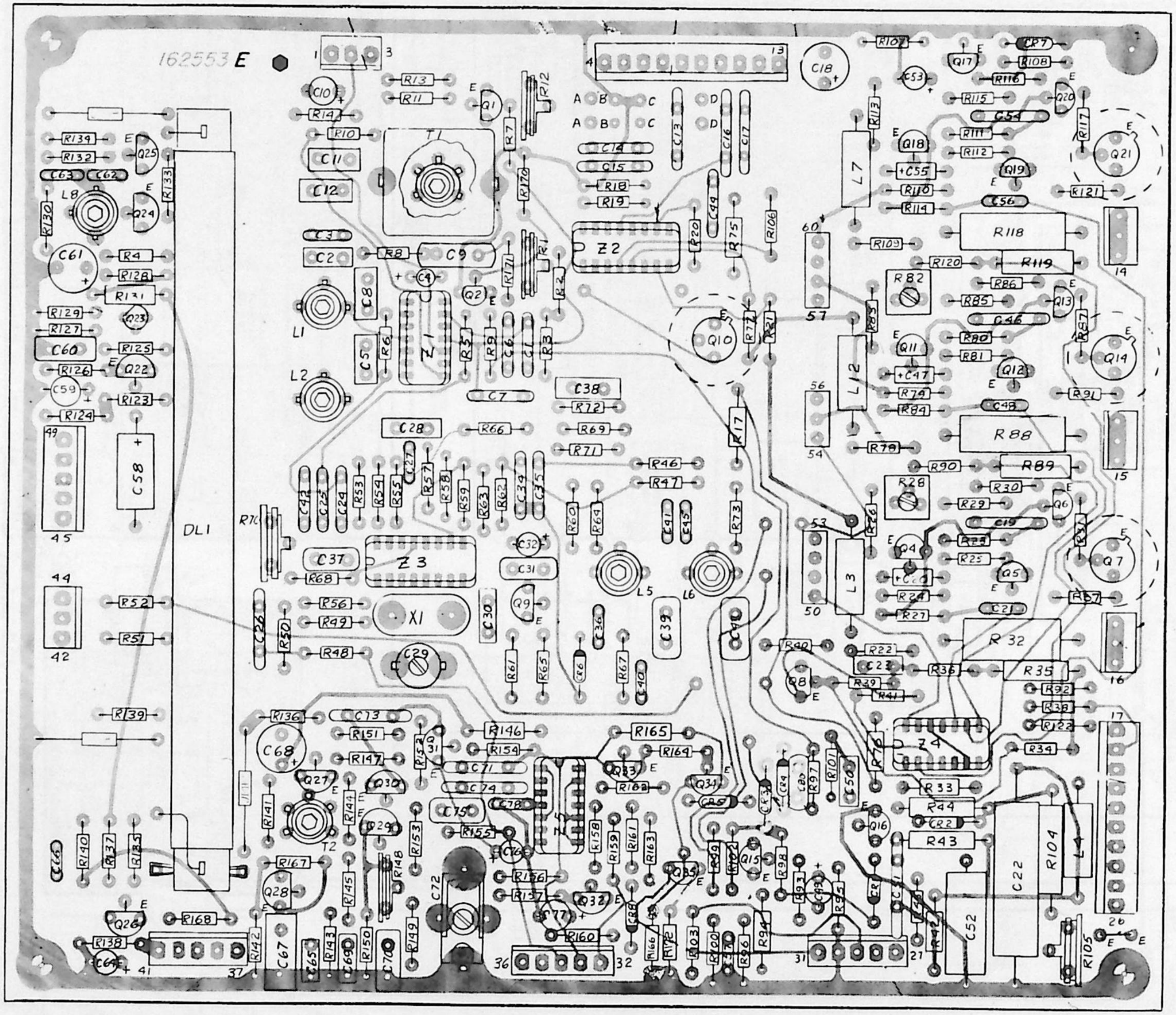
△3 THIS CONNECTION USED FOR APPROXIMATELY 2 MILLISECOND TIME CONSTANT.

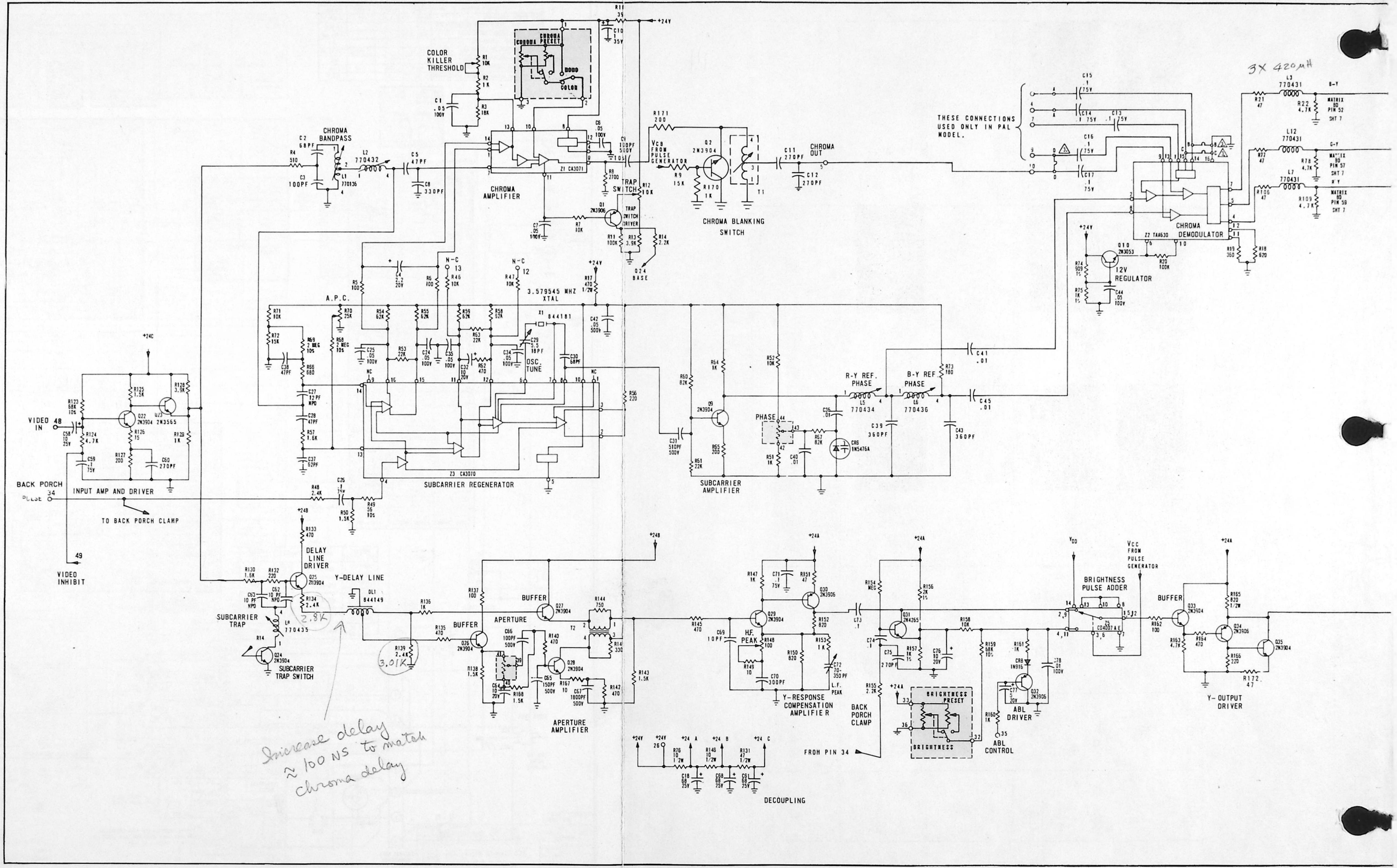
△4 THIS CONNECTION USED FOR APPROXIMATELY 7 MILLISECOND TIME CONSTANT.

△5 -001 BOARD WITHOUT JUMPER.
-002 BOARD WITH JUMPER.

PULSE CROSS MODULE
BOARD NO. 162586,
REV. D, DATED 3-24-76

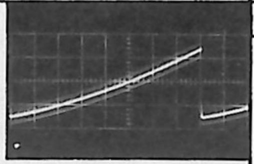
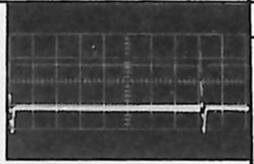
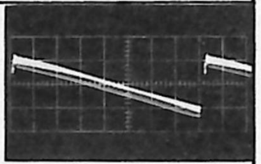
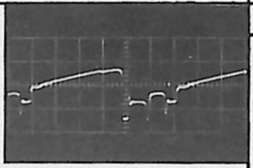
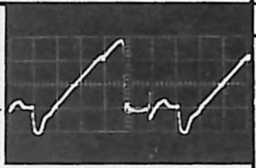
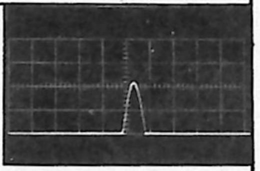
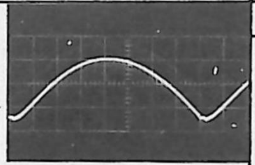
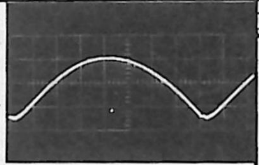
Symbol	Description	Conrac Part No.
PARTS LIST, PULSE CROSS BOARD 162586-001/-002		
	CAPACITORS	
C1	470pF, Dipped Mica, 500V, ± 10%	210555
C2, C5, C10	.001μF, Molded Polyester, 1000V, ± 10%	211145-102
C3	.0022μF, Molded Polyester, 1000V, ± 10%	211145-222
C4, C9	100μF, Electrolytic, 15V	2111605-001
C6, C7	.01μF, Molded Polyester, 630V, ± 10%	211146-103
C8	.1μF, Molded Polyester, 100V, ± 10%	211149-104
C11	5μF, Electrolytic, 25V	211410
C12	15μF, Electrolytic, 15V	211470
	DIODES	
CR1	Zener (1N759A)	206101
CR2, CR3	Switching (1N916)	206105
	INTEGRATED CIRCUITS	
Z1, Z3	MC14528CP	208102-001
Z2	MC14011CP	208103-001
	RESISTORS	
	Except as listed below, all resistors on this board are replaceable by 1/4W, ± 5% carbon film units. For exact value, see schematic diagram.	
R1	2700 ohms, Carbon Composition, 2W, ± 5%	201973
R8	Potentiometer, 50,000 ohms	928490
R13	Potentiometer, 250,000 ohms	928490-254
R21	10 ohms, Carbon Film, ½W, ± 5%	201332-100
	MISCELLANEOUS	
XZ1, XZ3	Socket, Integrated Circuit, DZP, 16-pin	935058
XZ2	Socket, Integrated Circuit, DZP, 14-pin	935057
	Terminal Wafer, 10 pin	886198-010


162553 E
Z1
Z2
Z3
Z4
Z5
T1
T2
L1
L2
L3
L4
L5
L6
L7
L8
L12
DL1
X1
R32
R35
R88
R89
R104
R118
R119
C18
C22
C52
C58
C61
C68
Q7
Q10
Q14
Q21
A
B
C
D
E



CHASSIS

TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3055	Vertical Output Amplifier	3.5 VDC  16 V=2V/cm, H=2msec/cm	3.0 VDC  15 V=1V/cm, H=2msec/cm	21.0 VDC  26 V=10V/cm, H=2msec/cm
Q2	BU108	Horizontal Output Switch	-0.2 VDC  V=5 V/cm, H=10µsec/cm	0.6 VDC  V=1V/cm, H=10µsec/cm	CAUTION: Do Not Meas. DC  V=500V/cm, H=10µsec/cm
Q3	39983	+200V Regulator Pass Element	205 VDC	205 VDC	232 VDC
Q4	2N3055	Horizontal B+ Regulator Pass Element	83.0 VDC  V=1V/cm, H=2msec/cm	82.0 VDC  V=1V/cm, H=2msec/cm	105 VDC
Q5	2N3055	+24V Regulator Pass Element	24.6 VDC	24.0 VDC	34.0 VDC

PRINTED WIRING BOARD TITLE/PART NUMBER	POWER AND GROUND DISTRIBUTION(PIN NO'S)			
	+24V	+100V	+200V	GROUND
SCAN BOARD 162572-002	25,47, 61	2,8,43	66	12,18,57,71
DUAL CHANNEL VIDEO INPUT BD 162654-001	9			1,8,18,23
PULSE CROSS BOARD 162586-001	(SYN) 24V			(SYN) GND
CONTROL BOARD 162563-001	2			6
VIDEO PROCESSOR BD 162553-001	26,58		25	3,8,11,30,36,45
NECK SOCKET BOARD 162482-002				GND
HIGH VOLTAGE MODULE 106373-001	J1-9	J1-8	J1-7	J1-5
HIGH VOLTAGE REGULATOR BOARD 162573-001	10	13		5,16,17

A		NEW DRAWING			1-7-75
	5630 5657	CORRECTED PIN NO. & WIRING ON 162508 BD. REVISED WIRING OF TJ P2-1,3 WAS P1-1,3 DELETED R1.R2,R17,S1,AND S2			
B	575	REVISED S5, S6 & WIRING. CHANGED F1 TO CB1.			
C	5910	162654-001 REPLACED 162575-001			
D	10047 10062	ADDED YELLOW WIRE FROM -CR1 TO +CR2 & ADDED R11			

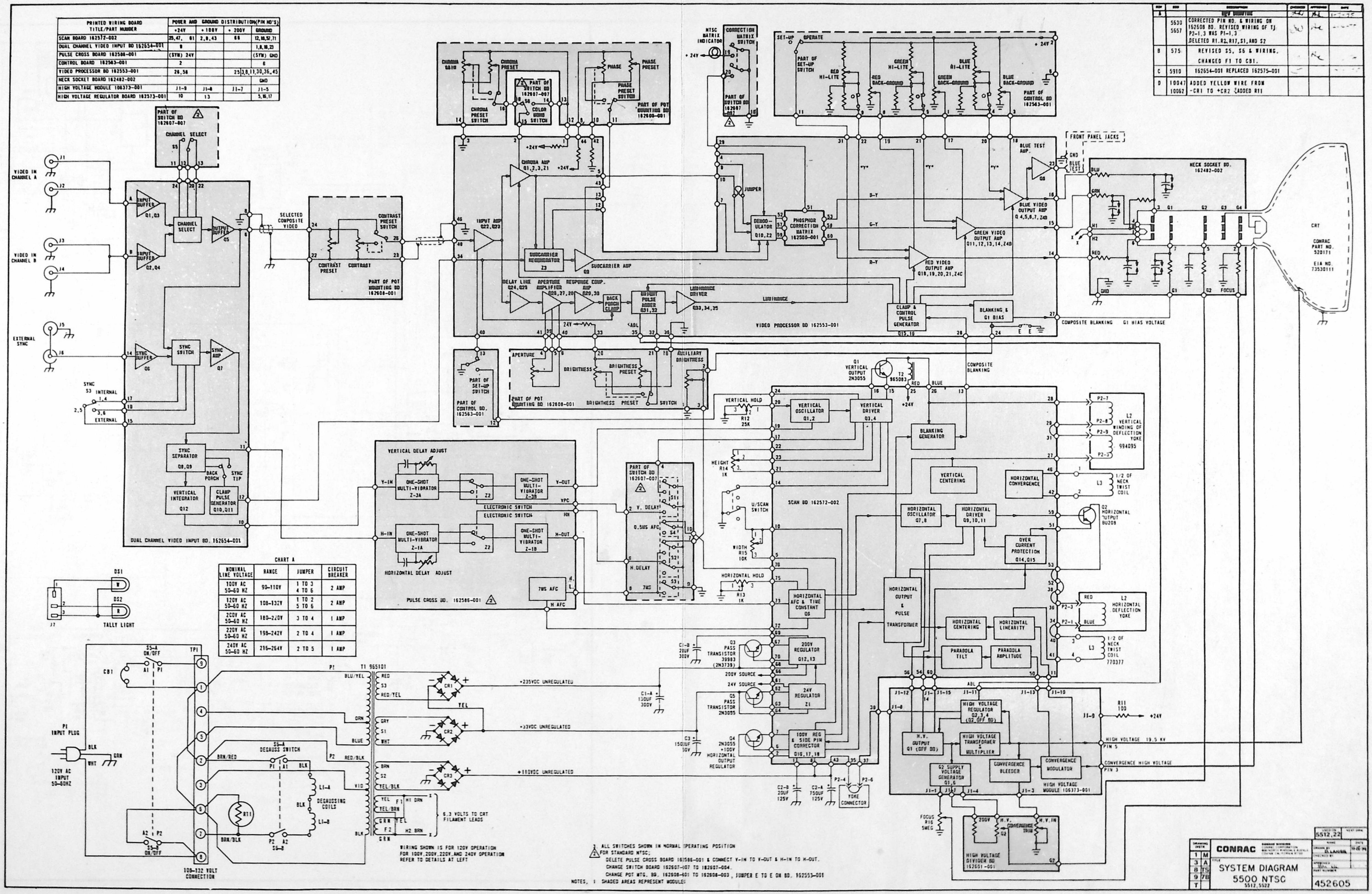


CHART A

NOMINAL LINE VOLTAGE	RANGE	JUMPER	CIRCUIT BREAKER
100V AC 50-60 HZ	90-110V	1 TO 3 4 TO 6	2 AMP
120V AC 50-60 HZ	108-132V	1 TO 2 5 TO 6	2 AMP
200V AC 50-60 HZ	180-220V	3 TO 4	1 AMP
220V AC 50-60 HZ	198-242V	2 TO 4	1 AMP
240V AC 50-60 HZ	216-264V	2 TO 5	1 AMP

3. ALL SWITCHES SHOWN IN NORMAL OPERATING POSITION

2 FOR STANDARD NTSC;
DELETE PULSE CROSS BOARD 162586-001 & CONNECT V-IN TO V-OUT & H-IN TO H-OUT.
CHANGE SWITCH BOARD 162607-007 TO 162607-004.
CHANGE POT MTG. BD. 162608-001 TO 162608-003, JUMPER E TO E ON BD. 162553-001

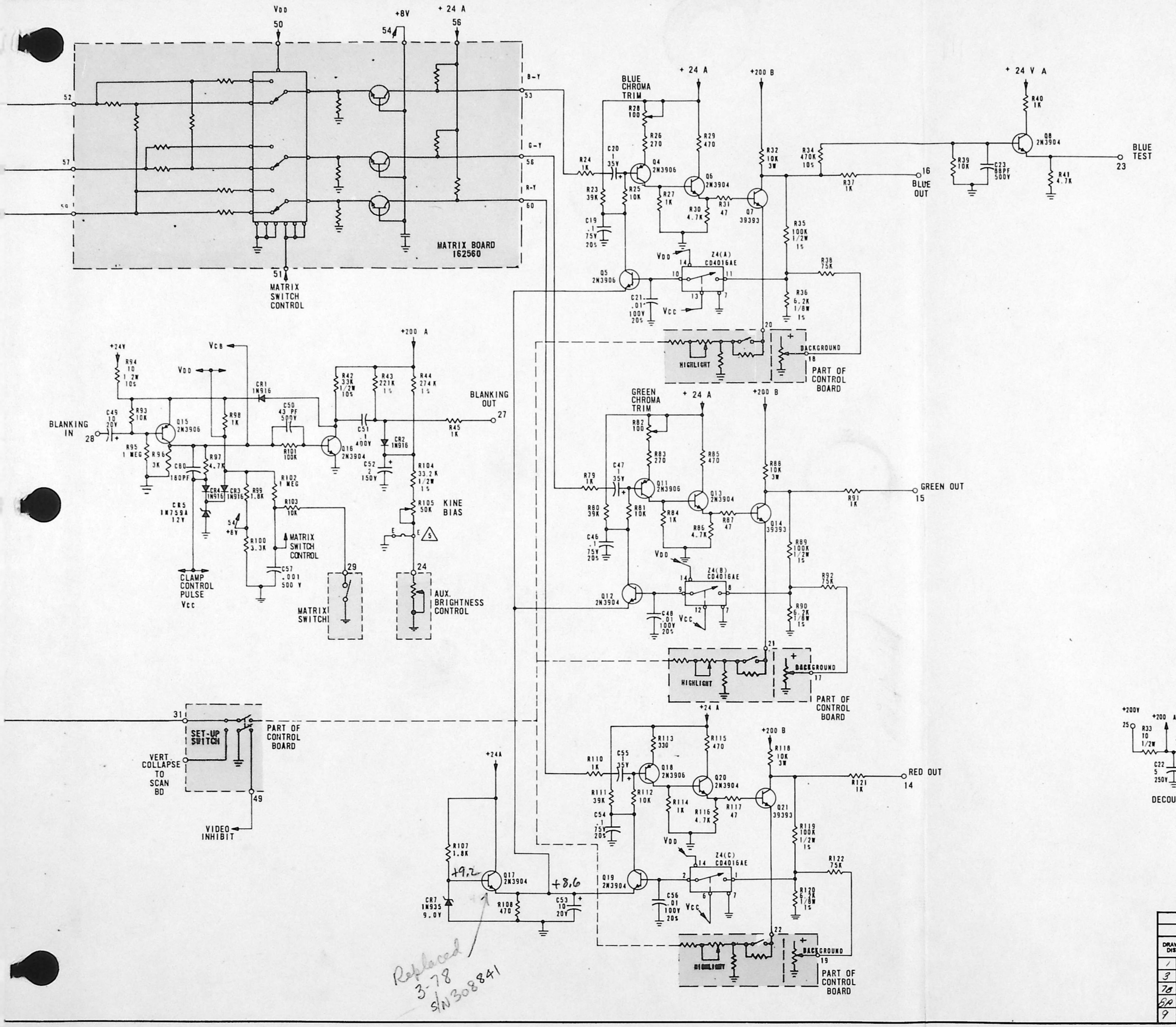
NOTES, 1 SHADED AREAS REPRESENT MODULES

5512,22

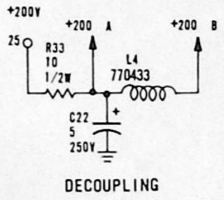
1	M	CONRAC		
3	A	SYSTEM DIAGRAM	B. LANGE	11-6-74
8	TS	5500 NTSC		
9	7B	5512,5522		
T			452605	

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			1/24/74
B	4689	REVISED R104, R43, R49			3-28-74
C	5107	REVISED NOTES, R107 WAS 1K, C50 WAS 10PF. CR7 WAS IN960. ADDED C 60 180PF			10-9-74

162553



Replaced 3-78 S/N308841



DECOUPLING

6. CONNECT Z1 PINS 3, 4 AND 5 TO GROUND (Z4 PIN 7).

⚠5 JUMPER POINTS E TO E, EXCEPT WHEN H. DELAY AUX BRIGHTNESS CONTROL IS USED.

4. CIRCUITRY IN SHADED AREAS SHOWN FOR FUNCTIONAL REPRESENTATION ONLY. FOR ACTUAL CIRCUIT REFER TO THE APPROPRIATE SCHEMATIC.

3. PLACE JUMPER BETWEEN D TO D, AND C TO C WHEN Z2 IS A PHILLIPS OR T.I. CHIP.
WHEN A FAIRCHILD OR SGS IS USED FOR Z2 DELETE JUMPER FROM C TO C AND ADD JUMPER TO B TO B

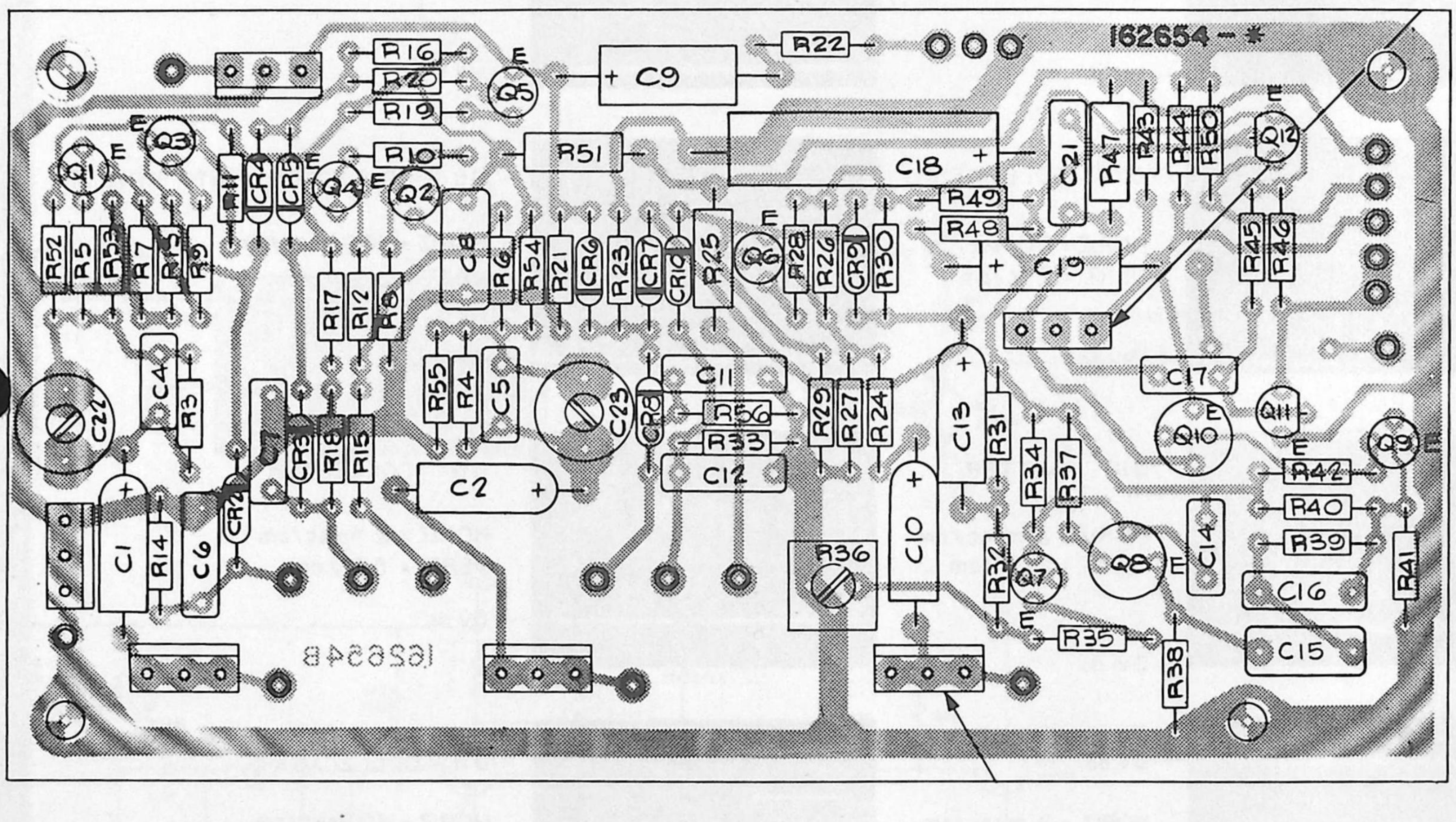
2. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/4W. CARBON COMP UNLESS OTHERWISE SPECIFIED.

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

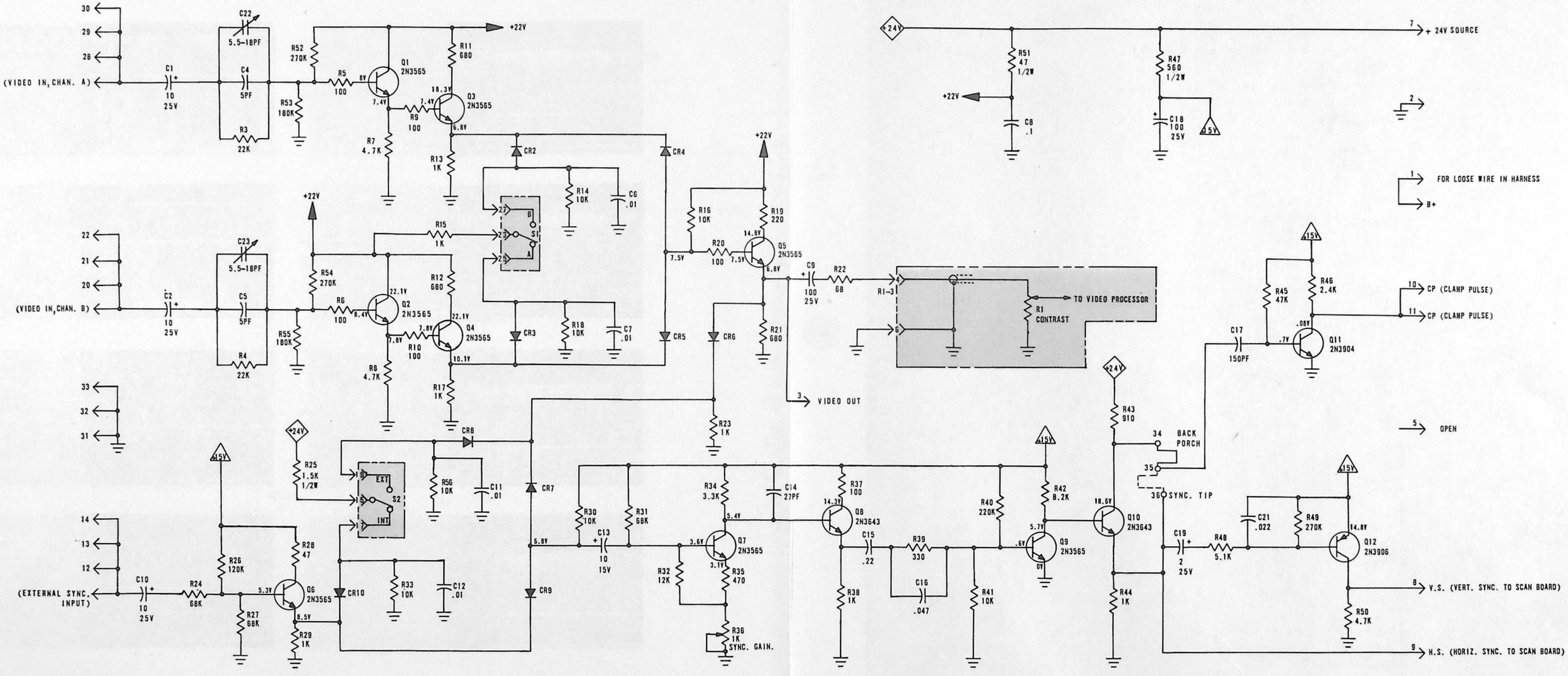
NOTES:

					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

DRAWING DISTR.		USED ON	NEXT DRW.	MATERIAL:		NAME	DATE
		5100/5500		~	CONRAC CONRAC DIVISION CONRAC CORPORATION 600 NORTH RIMSDALE AVENUE COVINA, CALIFORNIA 91722	DRAWN BY: D.R. PATCHEN	
1	T	TOLERANCE UNLESS OTHERWISE SPECIFIED:			TITLE:	CHECKED BY:	
3	M					APPROVED:	
78	A	.XX ± .03		FINISH	SCHEMATIC VIDEO PROCESSOR BOARD IN NTSC MODELS	PART NUMBER FEB 1 1974	
6A	EC	.XXX ± .010		~		162553	
9		ANGULAR: ± 1°					


162654-*
R16
R20
R19
R10
R22
E
Q5
C9
R51
C18
C21
R47
R43
R44
R50
Q12
E
Q3
Q1
R11
CR4
CR5
Q4
Q2
C8
R6
R54
R21
CR6
R23
CR7
CR10
R25
Q6
R28
R26
CR9
R30
R49
R48
C19
R45
R46
R52
R5
R53
R7
R13
R9
R17
R12
R8
C4
R3
C22
C7
CR3
R18
R15
R55
R4
C5
C23
CR8
C11
R56
R33
C12
R29
R27
R24
C13
R31
C17
Q11
Q10
Q9
R42
R40
R39
R41
C16
C15
R34
R37
C14
Q8
Q7
R32
R35
R38
C10
R36
C2
C1
R14
C6
CR2
162654B

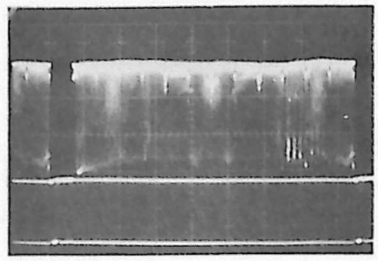
REV	ECO	DESCRIPTION	DFT	CHKD	APPD.	DATE
A		NEW DWG.			HL	8-7-75
B	5912	REVISED DESIGNATORS.			HL	8-21-75
C	6228	C4 AND C5 WERE 15PF			HL	6/10/76
D	10135	R19 WAS 470 Ω	S.M			



5. SHADED AREA INDICATES ITEM LOCATED OFF BOARD.
4. ALL DIODES ARE 1N916.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL RESISTOR VALUES ARE IN OHMS, ± 5% 1/4W.
1. JUMPER PLUG FOR BACK PORCH OR SYNC. TIP CLAMP SELECT.
NOTES: (UNLESS OTHERWISE SPECIFIED)

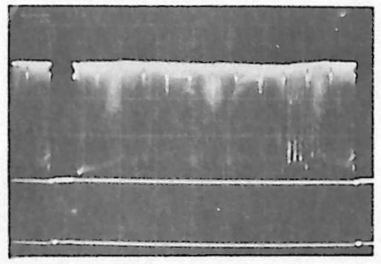
DUAL CHANNEL VIDEO INPUT MODULE
BOARD NO. 162654, REV. D, DATED 8-26-76

Symbol	Description	Conrac Part No.
DUAL CHANNEL VIDEO INPUT BOARD 162654-001		PARTS LIST
	CAPACITORS	
C1, C2, C10, C13	10μF, Electrolytic, 25V	211460
C4, C5	5pF, Dipped Mica, 500V, ± 5%	210035
C6, C7, C11, C12	.01μF, Molded Polyester, 630V, ± 10%	211146-103
C8	.1μF, Molded Polyester, 100V, ± 10%	211149-104
C9	100μF, Electrolytic, 15V	211605-001
C14	27pF, Ceramic Disc, 500V, ± 5%	210130
C15	.22μF, Molded Polyester, 100V, ± 10%	211150-224
C16	.047μF, Molded Polyester, 250V, ± 10%	211148-473
C17	150pF, Dipped Mica, 500V, ± 5%	210375
C18	100μF, Electrolytic, 25V	211615
C19	2μF, Electrolytic, 25V	211365
C21	.022μF, Molded Polyester, 400V, ± 10%	211147-223
C22, C23	5.5-18pF, Trimmer	211845
	DIODES	
CR2-CR10	Switching (1N916)	206105
	RESISTORS	
	Except as listed below, all resistors on this board are replaceable by 1/4W, ± 5%, carbon film units. For exact value, see schematic diagram.	
R25	1500 ohms, Carbon Film, ½W, ± 5%	201332-152
R36	Potentiometer, 1000 ohms	928490-102
R47	560 ohms, Carbon Film, ½W, ± 5%	201332-561
R51	47 ohms, Carbon Film, ½W, ± 5%	201332-470
	TRANSITORS	
Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9	NPN (2N3565)	207175
Q8, Q10	NPN (2N3643)	207205
Q11	NPN (2N3904)	207227
Q12	PNP (2N3906)	207228
	MISCELLANEOUS	
	Terminal Wafer, 3-Pin	886198-003
	Terminal Wafer, 3-Pin	886147-003
	Terminal	886145-002
	Connector Housing	886197-002



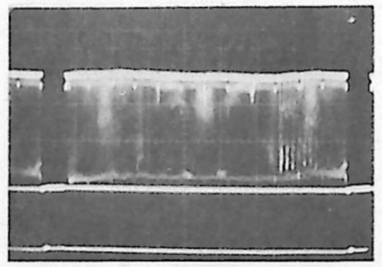
Q1 BASE

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



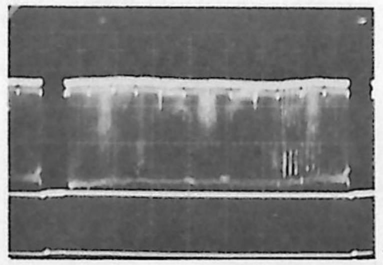
Q3 EMITTER

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



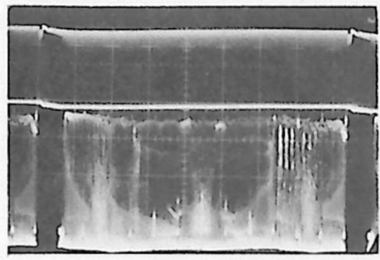
Q5 EMITTER

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



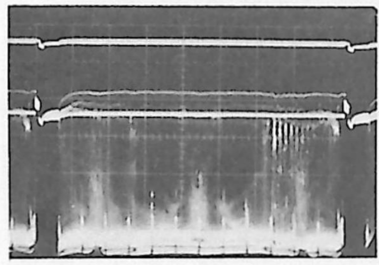
Q7 BASE

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



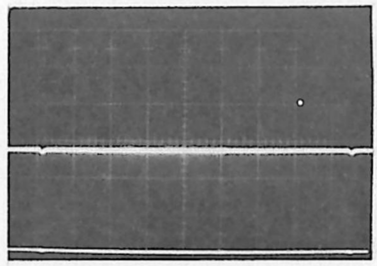
Q7 COLLECTOR

HORIZ = 2 msec/cm
VERT = 0.5 V./cm



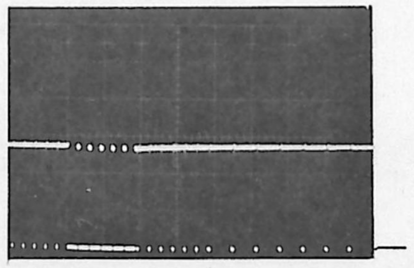
Q9 BASE

HORIZ = 2 msec/cm
VERT = 0.5 V./cm



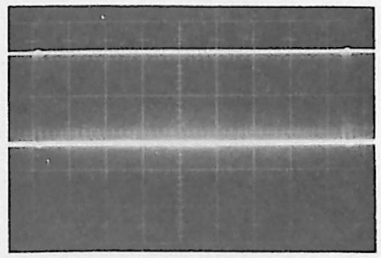
Q9 COLLECTOR

HORIZ = 2 msec/cm
VERT = 5 V./cm



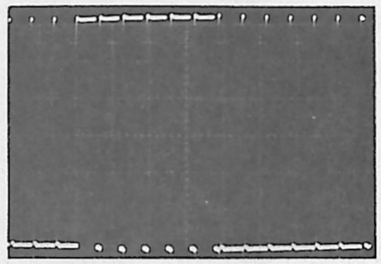
Q9 COLLECTOR

HORIZ = 100 µsec/cm
VERT = 5 V./cm



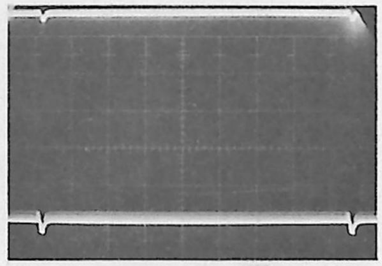
Q10 COLLECTOR

HORIZ = 2 msec/cm
VERT = 5 V./cm



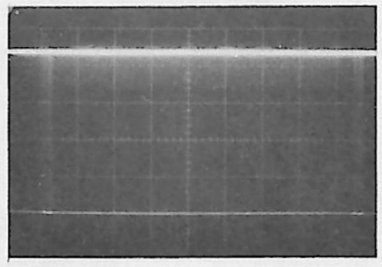
Q10 COLLECTOR

HORIZ = 50µsec/cm
VERT = 2 V./cm



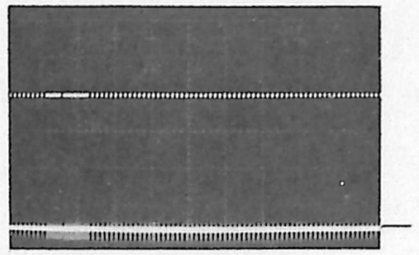
Q10 EMITTER

HORIZ = 2 msec/cm
VERT = 2 V./cm



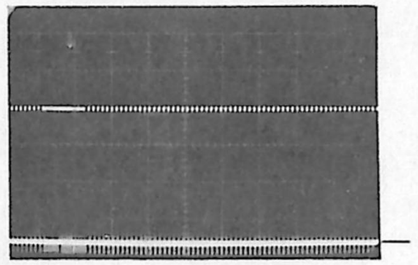
HORIZ = 2 msec/cm
VERT = 2 V./cm

Q11 BASE



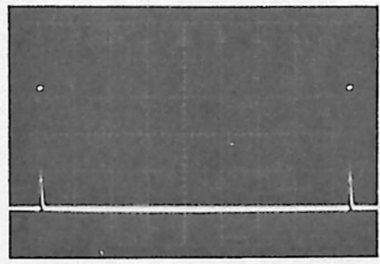
Q11 COLLECTOR

HORIZ = 500 µsec/cm
VERT = 0.2 V./cm



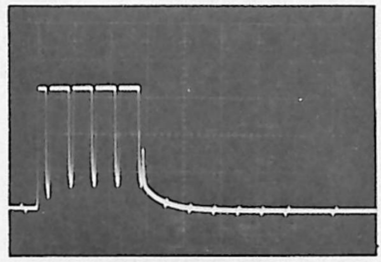
Q11 COLLECTOR WITH SYNC TIP

HORIZ = 500 µsec/cm
VERT = 0.2 V./cm



Q11 COLLECTOR

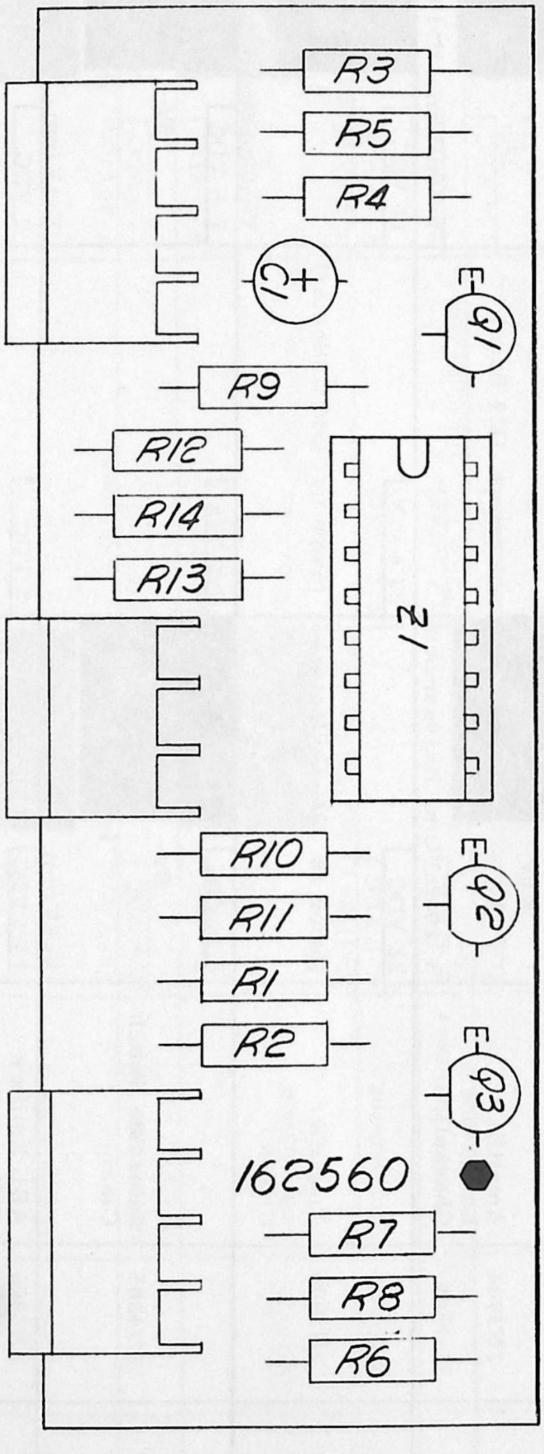
HORIZ = 2 msec/cm
VERT = 5 V./cm



Q11 COLLECTOR

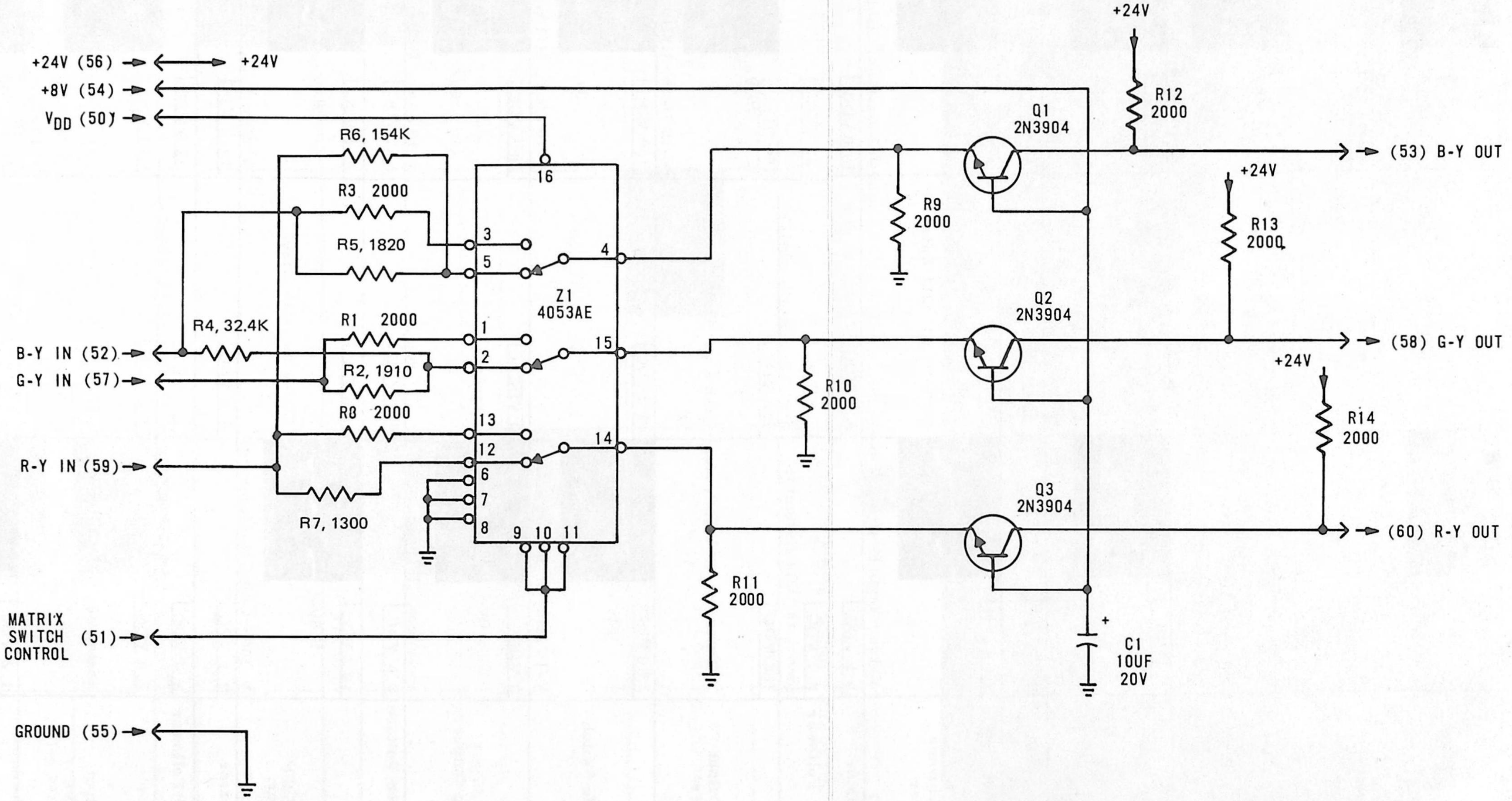
HORIZ = 50 µsec/cm
VERT = 5 V./cm

NOTE: PHOTOS TAKEN USING BACK PORCH (RATHER THAN SYNC TIP) CLAMP.


R3
R5
R4
C1
+
E
Q1
R9
R12
R14
R13
I2
R10
R11
R1
R2
E
Q2
E
Q3
162560
R7
R8
R6

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE

162560-001



1. ALL RESISTOR VALUES ARE IN OHMS, 1/8W, ±1%, RN55C OR EQUIVALENT.

NOTES: UNLESS OTHERWISE SPECIFIED.

162560-001

					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

DRAWING DISTR.		USED ON	NEXT DRW.
		5000 SER.	
1	T	TOLERANCE UNLESS OTHERWISE SPECIFIED:	
3	M		
7B	A	.XX ± .03	
8A		.XXX ± .010	
9		ANGULAR: ± 1°	

MATERIAL

—

FINISH

—

CONRAC

CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:

SCHEMATIC
MATRIX BOARD

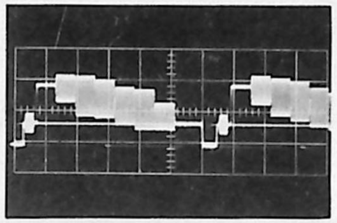
	NAME	DATE
DRAWN BY:	R. MCCARTNEY	2-14-74
CHECKED BY:	R STILES	7-17-73
APPROVED:	R CARSON	10-29-73

PART NUMBER

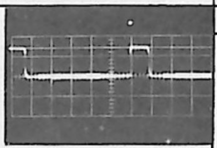
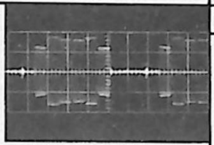
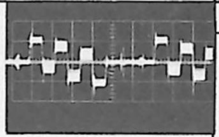
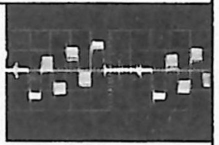
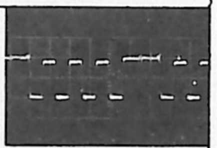
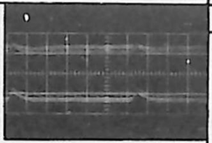
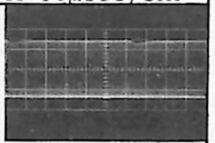
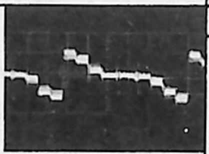
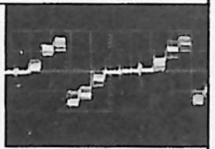
162560-001

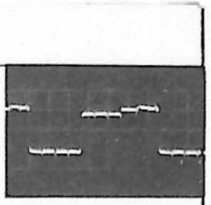
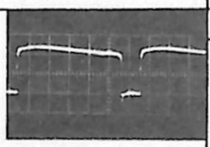
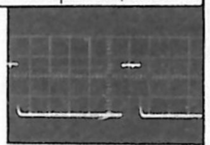
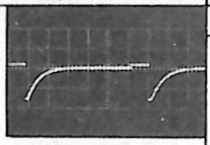
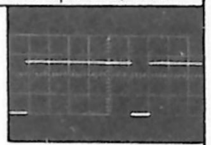
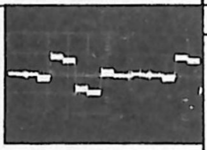
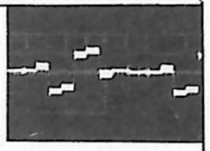
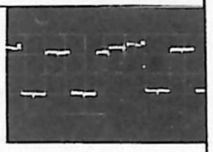
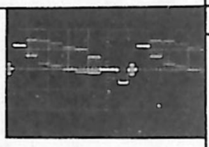
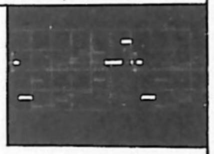
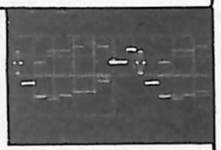
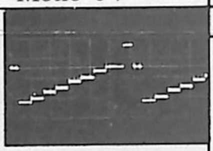
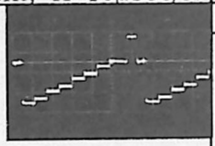
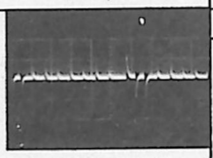
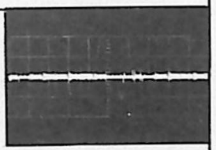
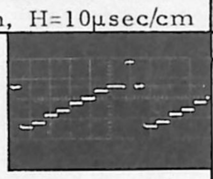
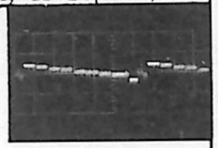
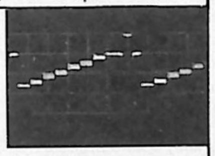
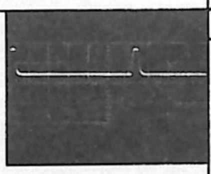
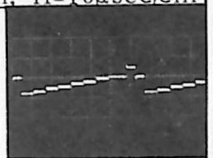
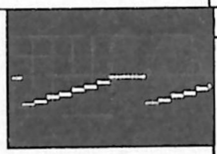
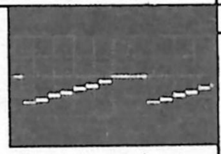
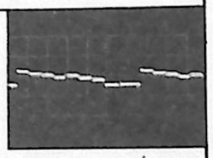
VIDEO PROCESSOR BOARD NO. 162553

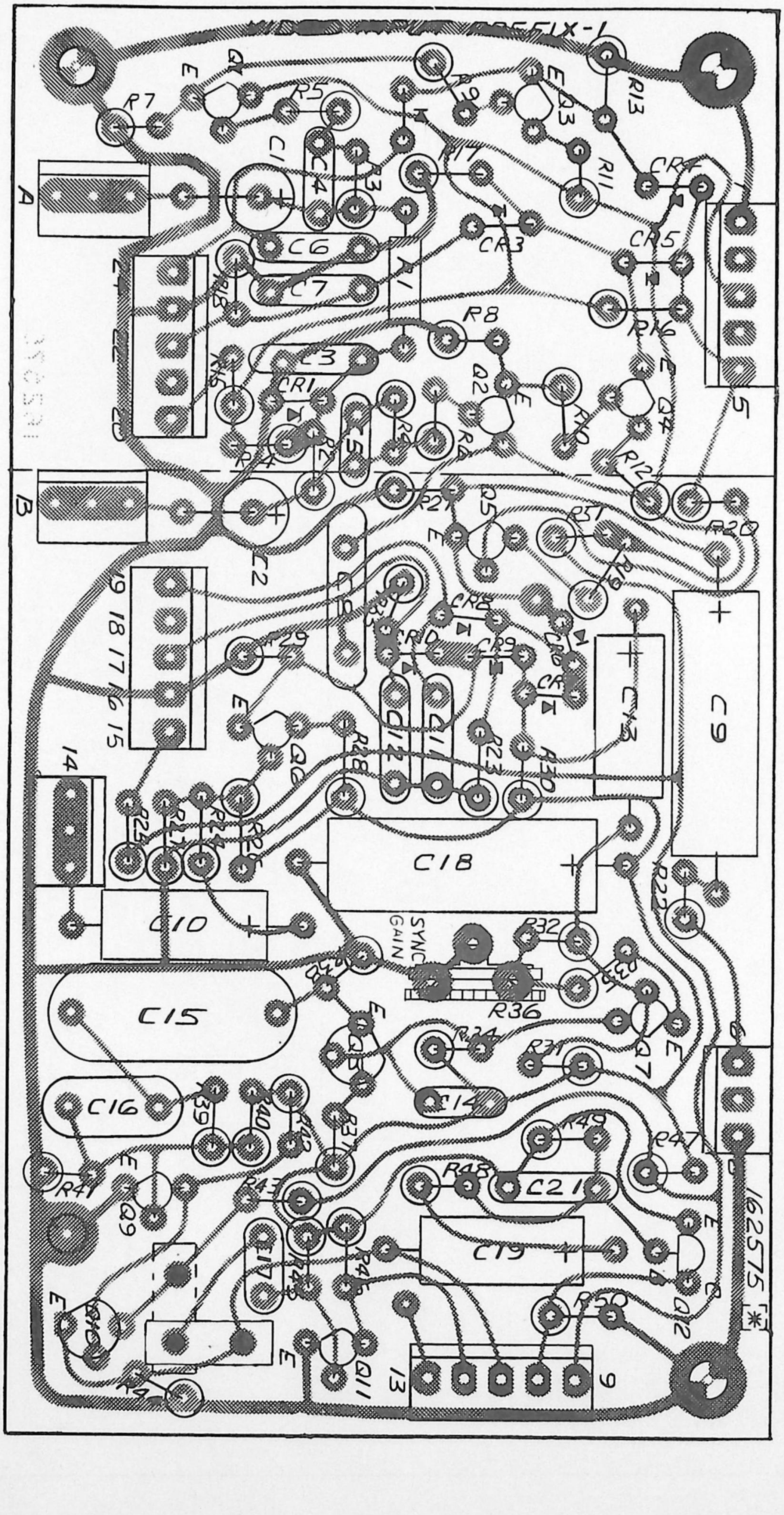
TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 voltmeter. All monitor controls adjusted for normal operation.



Standard Color Bar Test Input Signal:

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3906	Saturable Switch 3.58MHz Trap	Color 15V, Mono 20V	16.5 VDC Varies with R12	Color 6V, Mono 2V
Q2	2N3904	Chroma Blanking	0.1 VDC  V=500mV/cm, H=10μsec/cm	0 VDC  V=200mV/cm, H=10μsec/cm	ground Ground
Q4	2N3906	Blue Chroma Amplifier	19.5 VDC  V=200mV/cm, H=10μsec/cm	20.0 VDC (Same as Q4 Base)	8.2 VDC  V=500mV/cm, H=10μsec/cm
Q5	2N3904	Comparator	9.0 VDC	8.6 VDC	19.5 VDC
Q6	2N3904	Emitter Follower	8.2 VDC (Same as Q4 Collector)	7.6 VDC (Same as Q4 Collector)	22 VDC
Q7	39393	Output Amplifier Blue	7.6 VDC (Same as Q4 Collector)	7.0 VDC (Same as Q4 Collector)	150 VDC  V=10V/cm, H=10μsec/cm
Q9	2N3904	Subcarrier Amplifier	1.5VDC  V=.5V/cm, H=10μsec/cm	1.1VDC (Same as Q9 Base)	11.0 VDC  V=1V/cm, H=10μsec/cm
Q10	2N3053	12V Regulator Pass Transistor	12.5 VDC	12.0 VDC	24.0 VDC
Q11	2N3904	Green Chroma Amplifier	19.5 VDC  V=100mV/cm, H=10μsec/cm	20.0 VDC (Same as Q11 Base)	8.2 VDC  V=200mV/cm, H=10μsec/cm
Q12	2N3904	Comparator	9.1 VDC	8.6 VDC	19.0 VDC

Q13	2N3904	Emitter Follower	8.2 VDC (Same as Q11 Collector)	7.8 VDC Same as Q11 Collector	22 VDC
Q14	39393	Green Output Amplifier	7.8 VDC (Same as Q11 Collector)	7.2 VDC (Same as Q11 Collector)	150 VDC 150V–  V=10V/cm, H=10µsec/cm
Q15	2N3906	Saturable Switch	25.0 VDC 24V–  V=1V/cm, H=10µsec/cm	24.0 VDC	4.0 VDC 0V–  V=10V/cm, H=10µsec/cm
Q16	2N3904	Blanking Output	0 VDC 0V–  V=5V/cm, H=10µsec/cm	0 VDC Ground	20.5 VDC 0V–  V=10V/cm, H=10µsec/cm
Q17	2N3904	Reference Voltage Source	8.6 VDC	9.2 VDC	23.0 VDC
Q18	2N3906	Red Chroma Amplifier	19.5 VDC 19.5V–  V=100mV/cm, H=10µsec/cm	20.0 VDC (Same as Q18 Base)	8.4 VDC 8.4V–  V=200mV/cm, H=10µsec/cm
Q19	2N3904	Comparator	9.1 VDC	8.6 VDC	19.0 VDC
Q20	2N3904	Emitter Follower	8.4 VDC (Same as Q18 Collector)	7.8 VDC (Same as Q18 Collector)	22.0 VDC
Q21	39393	Red Output Amplifier	7.8 VDC (Same as Q18 Collector)	7.2 VDC (Same as Q18 Collector)	150 VDC 150V–  V=10V/cm, H=10µsec/cm
Q22	2N3904	Video Input Amplifier	1.2 VDC 1.2V–  V=100mV/cm, H=10µsec/cm	0.6 VDC (Same as Q22 Base)	17.0 VDC 17V–  V=500mV/cm, H=10µsec/cm
Q23	2N3565	Emitter Follower	17 VDC (Same as Q22 Collector)	16.2 VDC (Same as Q22 Collector)	21.5 VDC
Q24	2N3904	Saturable Switch	Color 0.7V, Mono 0V	0 VDC Ground	0 VDC 0V–  Mono only Color 0VDC V=500mV/cm, H=10µsec/cm
Q25	2N3904	Emitter Follower	16 VDC 16V–  V=500mV/cm, H=10µsec/cm	15.4 VDC (Same as Q25 Base)	21 VDC
Q26	2N3904	Emitter Follower	7.2 VDC 7.2V–  V=200mV/cm, H=10µsec/cm	6.6 VDC (Same as Q26 Base)	22 VDC
Q27	2N3904	Emitter Follower	7.2 VDC (Same as Q26 Base)	6.6 VDC (Same as Q26 Base)	22 VDC
Q28	2N3904	Differentiator (Aperture set at Maximum)	6.6 VDC 6.6V–  V=50mV/cm, H=10µsec/cm	6.0 VDC (Same as Q28 Base)	22 VDC 22V–  V=200mV/cm, H=10µsec/cm
Q29	2N3904	Amplifier Luminance Channel	6.6 VDC 6.6V–  V=200mV/cm, H=10µsec/cm	6.0 VDC (Same as Q29 Base)	22 VDC 22V–  V=50mV/cm, H=10µsec/cm
Q30	2N3906	Amplifier Luminance Channel	22 VDC (Same as Q29 Collector)	22.6 VDC (Same as Q30 Collector)	11 VDC 11V–  V=500mV/cm, H=10µsec/cm
Q31	2N4265	Saturable Switch Clamp	2.0 VDC 0V–  V=5V/cm, H=10µsec/cm	7.6 VDC	7.5 VDC 7.5V–  V=1V/cm, H=10µsec/cm
Q32	2N3906	ABL Emitter Follower	13.5 VDC	7 VDC	0 VDC Ground
Q33	2N3904	Emitter Follower	7.5 VDC 7.5V–  V=1V/cm, H=10µsec/cm	7.0 VDC (Same as Q33 Base)	23 VDC
Q34	2N3906	Luminance Output Driver Emitter Follower	7.0 VDC (Same as Q33 Base)	7.2 VDC 7.2V–  V=1V/cm, H=10µsec/cm	0.7 VDC .7V–  V=50mV/cm, H=10µsec/cm
Q35	2N3904	Luminance Output Driver Current Amplfier	0.7 VDC (Same as Q34 Collector)	0VDC Ground	7.2 VDC (Same as Q34 Emitter)



A
B
C1
C2
C3
C4
C5
C6
C7
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C21
CR1
CR3
CR4
CR5
CR8
CR9
CR10
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
R1
R4
R5
R7
R8
R9
R10
R11
R12
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R16
R17
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R26
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R28
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R31
R32
R33
R34
R36
R37
R39
R40
R41
R42
R43
R44
R45
R46
R47
R48
R49
R50
SYNC GAIN
E
14
13
9
5
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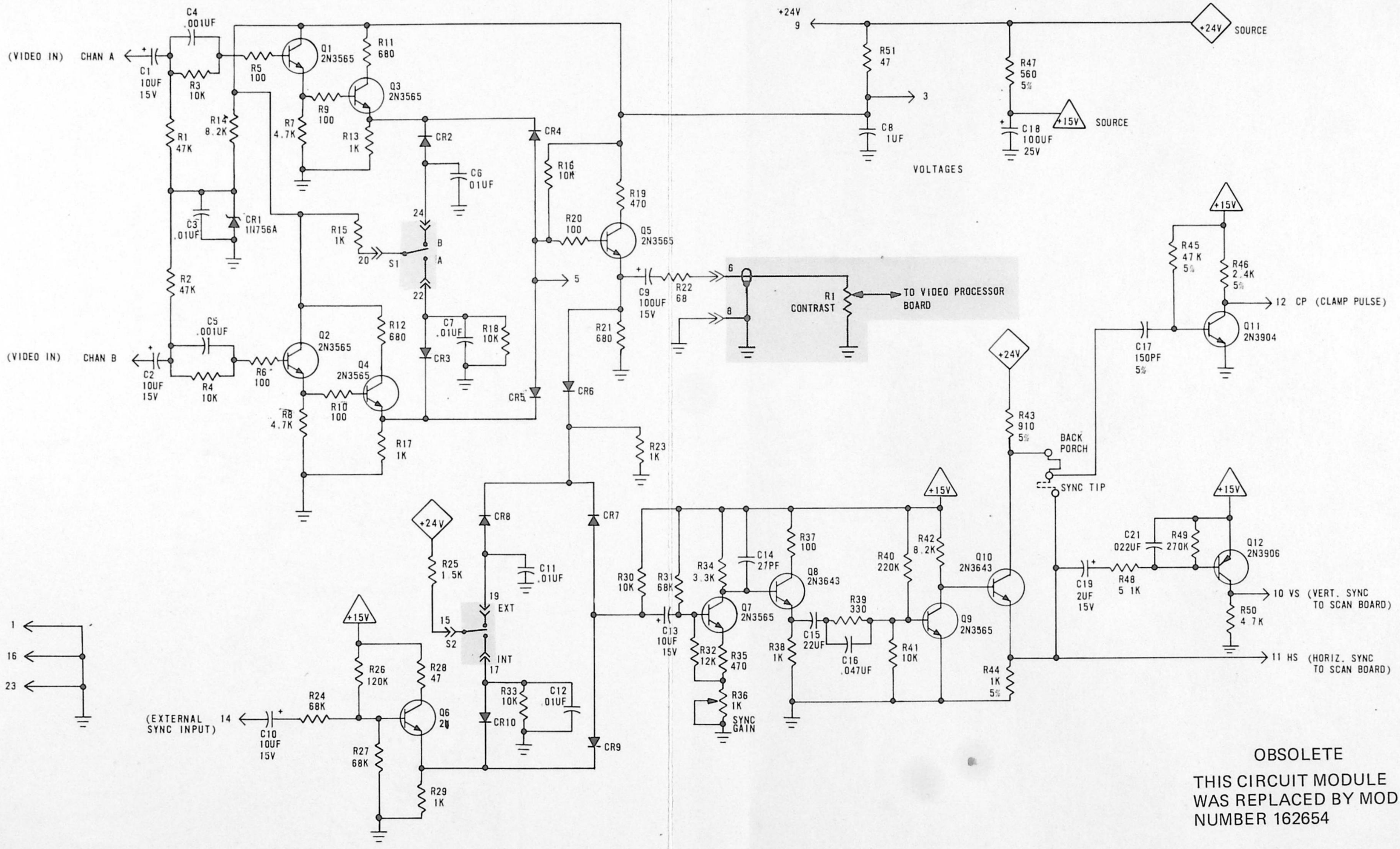
16
17
18
19
162575

162575

162575

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
C.	4967	REDRAWN (NO CHANGES)			



OBSOLETE

THIS CIRCUIT MODULE
WAS REPLACED BY MODULE
NUMBER 162654

5. SHADED AREA INDICATED ITEM LOCATED OFF BOARD
4 ALL DIODES ARE PG912
3 ALL CAPACITOR VALUES ARE IN MICROFARADS
2. ALL RESISTOR VALUES ARE IN OHMS, ±10% ½W
1. JUMPER PLUG FOR BACK PORCH OR SYNC TIP CLAMP SELECTION
NOTES: UNLESS OTHERWISE SPECIFIED

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR	USED ON	NEXT DRW
	5100/5500	

DRAWING DISTR	
1	TS
3	M
7B	A
8A	
9	

TOLERANCE
UNLESS OTHERWISE
SPECIFIED:
XX ± .03
XXX ± .010
ANGULAR ± 1°

MATERIAL

FINISH

CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

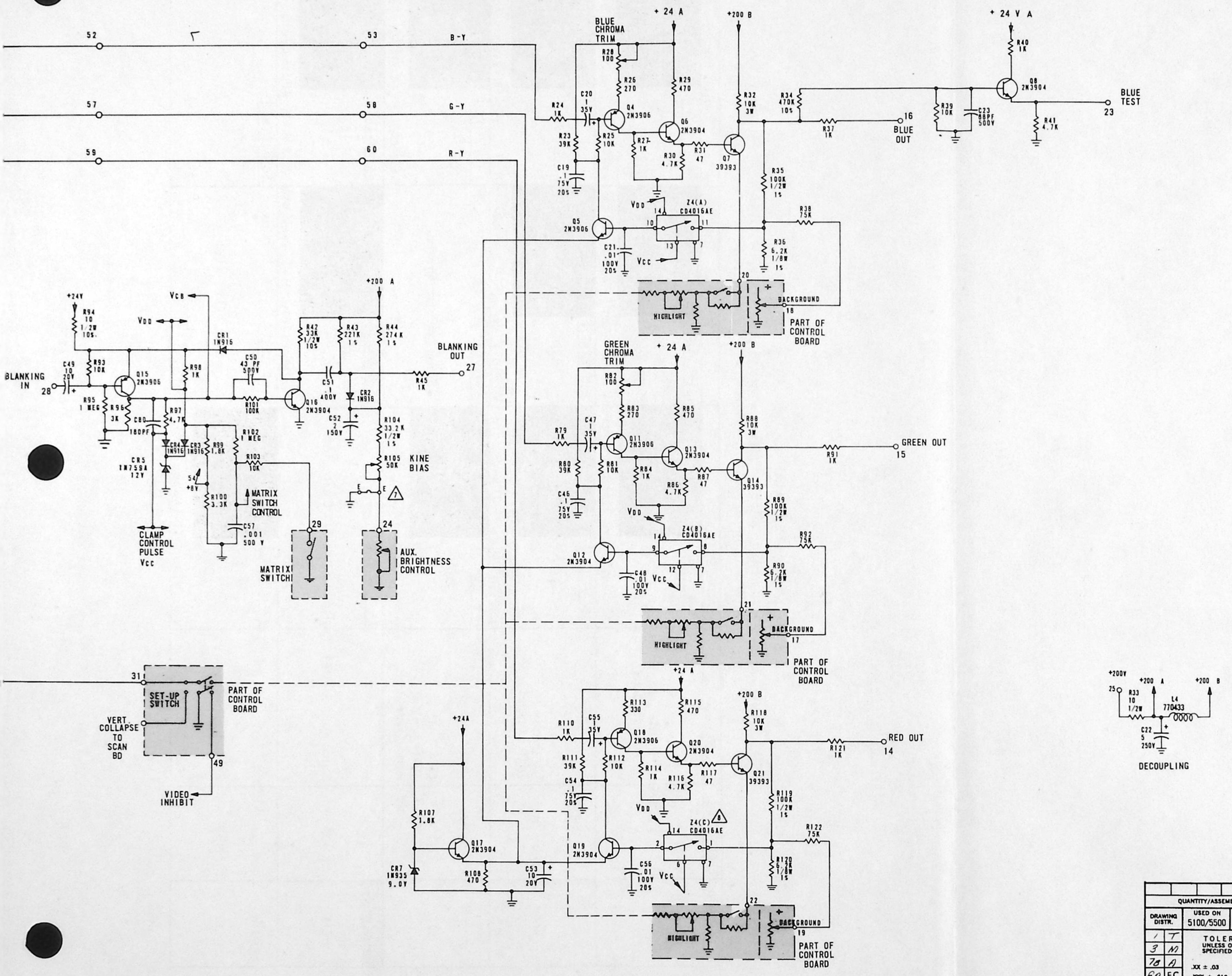
TITLE
SCHEMATIC, DUAL CHANNEL
VIDEO INPUT BOARD

	NAME	DATE
DRAWN BY	E.J. SPRAGUE	7-16-74
CHECKED BY	[illegible]	[illegible]
APPROVED	[illegible]	[illegible]

PART NUMBER
162575

162553

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			1/24/74
B	4689	REVISED R104, R43, R44			3-28-74
C	5107	REVISED NOTES, R107 WAS 1K, C50 WAS 10PF, CR7 WAS IN 960. ADDED C 80 180PF			10-9-74



⑥ CONNECT Z4 PINS 3,4 AND 5 TO GROUND (Z4 PIN 7).

⑤ JUMPER POINTS E TO E, EXCEPT WHEN H. DELAY AUX BRIGHTNESS CONTROL IS USED.

4 CIRCUITRY IN SHADED AREAS ARE SHOWN FOR FUNCTIONAL REPRESENTATION ONLY. FOR ACTUAL CIRCUIT REFER TO THE APPROPRIATE SCHEMATIC.

③ REFER TO COMPONENT CHART FOR VALUE OF COMPONENTS INDICATED

2. ALL RESISTOR VALUES ARE IN OHMS ± 5%, 1/4W, CARBON COMP, UNLESS OTHERWISE SPECIFIED.

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

NOTES:

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR.		USED ON	NEXT DRW.
1	T	5100/5500	
3	M	TOLERANCE UNLESS OTHERWISE SPECIFIED:	
7B	A	.XX ± .03	
6A	EC	.XXX ± .010	
9		ANGULAR: ± 1°	

MATERIAL: ~

FINISH ~

CONRAC

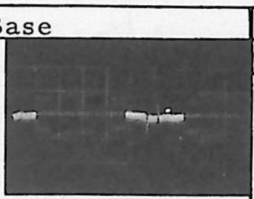
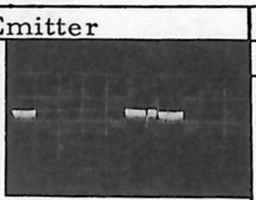
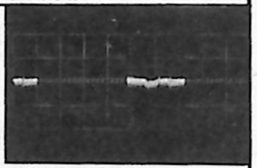
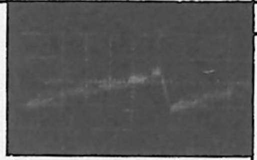
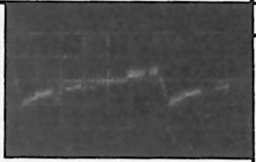
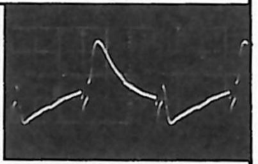
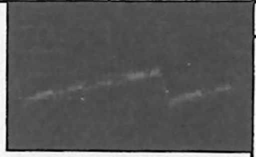
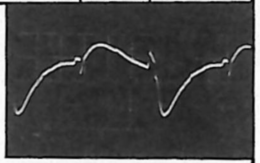
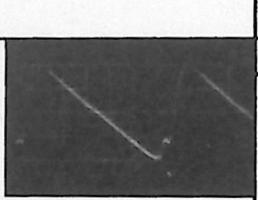
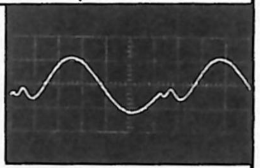
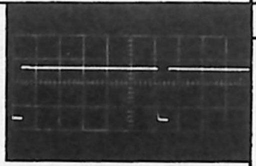
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:
SCHEMATIC
VIDEO PROCESSOR
BOARD
IN PAL MODELS

	NAME	DATE
DRAWN BY:	D.R. PATCHEN	
CHECKED BY:		1-2/74
APPROVED:		
PART NUMBER		
	162553	

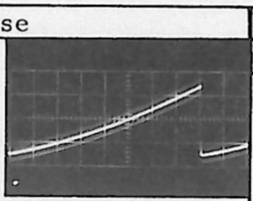
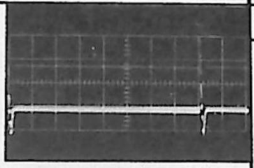
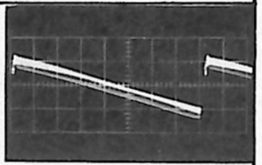
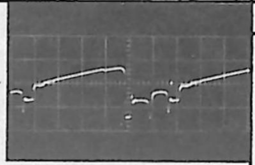
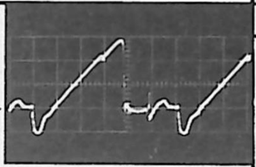
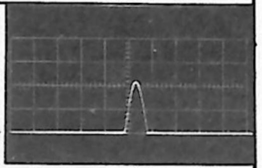
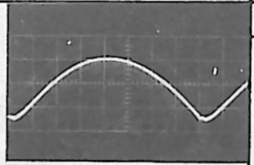
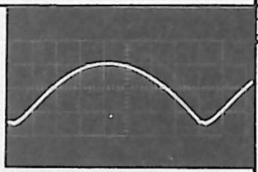
PAL BOARD NO. 162584

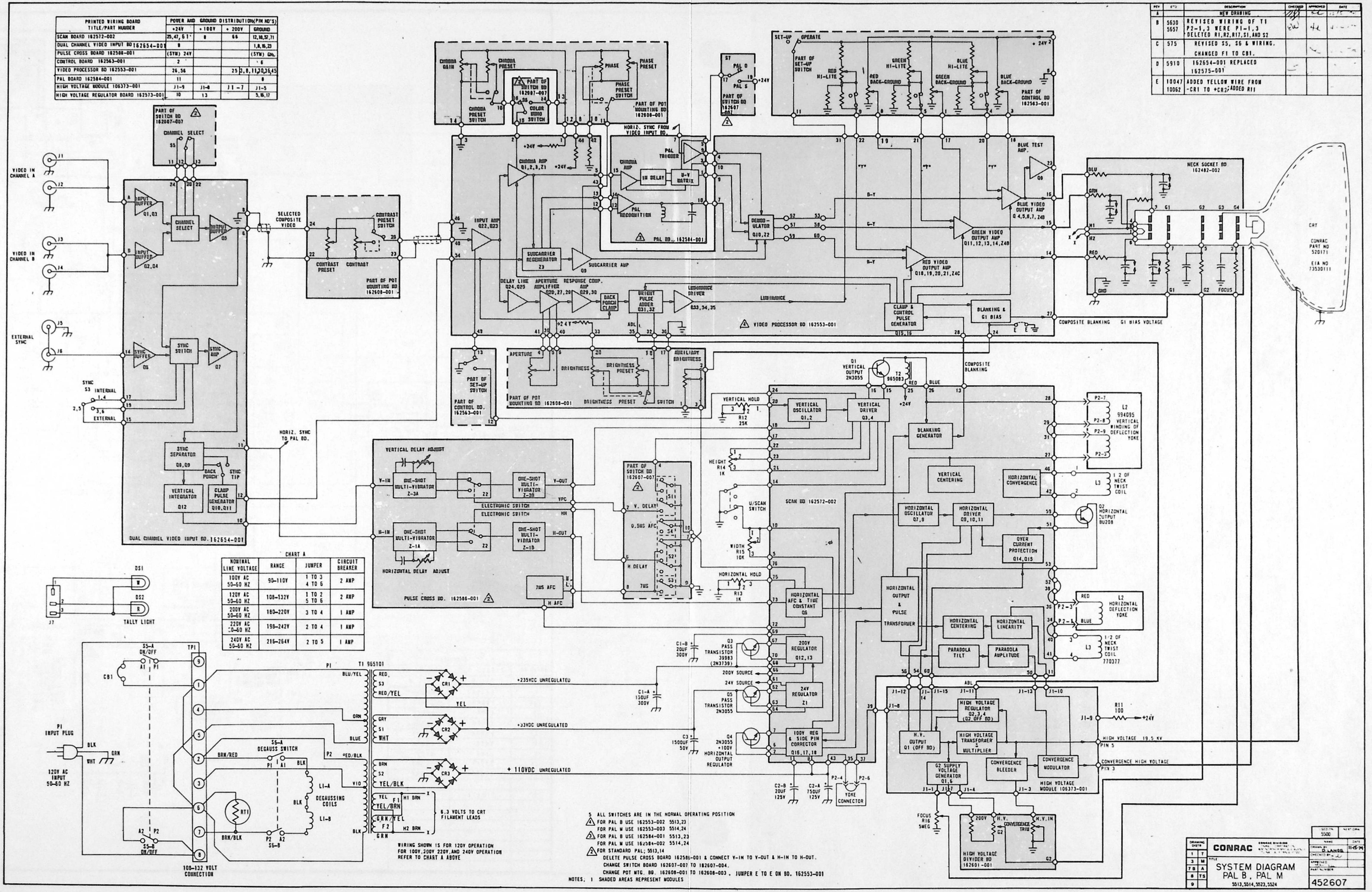
TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-Type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3512	Chroma Amplifier Phase Splitter	16.4 VDC  V=50mV/cm, H=10μsec/cm	15.8 VDC  V=50mV/cm, H=10μsec/cm	24.0 VDC  V=100mV/cm, H=10μsec/cm
Q2	2N3565	One-half Differential Amplifier	8.6 VDC  V=50mV/cm, H=10μsec/cm	8.0 VDC  V=50mV/cm, H=10μsec/cm	16 VDC  V=1V/cm, H=20μsec/cm
Q3	2N3565	One-half Differential Amplifier	8. 6 VDC  V=50mV/cm, H=10μsec/cm	8.0 VDC (Same as Q2 Emitter)	15.0 VDC  V=1V/cm, H=20μsec/cm
Q4	2N3565	Saturable Switch	15 VDC (Same as Q3 Collector)	15.6 VDC  V=200mV/cm, H=20μsec/cm	24.0 VDC  V=2V, H=20μsec/cm
Q5	2N3565	Emitter Follower	12.0 VDC  V=5V/cm, H=10μsec/cm	11.4 VDC (Same as Q5 Base)	24.0 VDC

CHASSIS

TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3055	Vertical Output Amplifier	3.5 VDC  V=2V/cm, H=2msec/cm	3.0 VDC  V=1V/cm, H=2msec/cm	21.0 VDC  V=10V/cm, H=2msec/cm
Q2	BU108	Horizontal Output Switch	-0.2 VDC  V=5 V/cm, H=10µsec/cm	0.6 VDC  V=1V/cm, H=10µsec/cm	CAUTION: Do Not Meas. DC  V=500V/cm, H=10µsec/cm
Q3	39983	+200V Regulator Pass Element	205 VDC	205 VDC	232 VDC
Q4	2N3055	Horizontal B+ Regulator Pass Element	83.0 VDC  V=1V/cm, H=2msec/cm	82.0 VDC  V=1V/cm, H=2msec/cm	105 VDC
Q5	2N3055	+24V Regulator Pass Element	24.6 VDC	24.0 VDC	34.0 VDC



PRINTED WIRING BOARD TITLE/PART NUMBER	POWER AND GROUND DISTRIBUTION(PIN NO'S)			
	+24V	+100V	+200V	GROUND
SCAN BOARD 162572-002	25,47,61	8	66	12,18,57,71
DUAL CHANNEL VIDEO INPUT BD 162654-001	8			1,8,15,23
PULSE CROSS BOARD 162586-001	(SYM) 24V			(SYM) GND.
CONTROL BOARD 162563-001	2			6
VIDEO PROCESSOR BD 162553-001	26,56		25	3,8,11,30,36,45
PAL BOARD 162584-001	11			8
HIGH VOLTAGE MODULE 106373-001	J1-9	J1-8	J1-7	J1-5
HIGH VOLTAGE REGULATOR BOARD 162573-001	10	13		5,15,17

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			
B	5630 5657	REVISED WIRING OF T1 P2-1,3 WERE P1-1,3 DELETED R1,R2,R17,S1,AND S2			
C	575	REVISED S5, S6 & WIRING. CHANGED F1 TO CB1.			
D	5910	162654-001 REPLACED 162575-001			
E	10047 10062	ADDED YELLOW WIRE FROM -CR1 TO +CR2; ADDED R11			

CHART A

NOMINAL LINE VOLTAGE	RANGE	JUMPER	CIRCUIT BREAKER
100V AC 50-60 HZ	90-110V	1 TO 3 4 TO 6	2 AMP
120V AC 50-60 HZ	108-132V	1 TO 2 5 TO 6	2 AMP
200V AC 50-60 HZ	180-220V	3 TO 4	1 AMP
220V AC 50-60 HZ	198-242V	2 TO 4	1 AMP
240V AC 50-60 HZ	216-264V	2 TO 5	1 AMP

WIRING SHOWN IS FOR 120V OPERATION
FOR 100V,200V 220V,AND 240V OPERATION
REFER TO CHART A ABOVE

5 ALL SWITCHES ARE IN THE NORMAL OPERATING POSITION
④ FOR PAL B USE 162553-002 5513,23
FOR PAL M USE 162553-003 5514,24
③ FOR PAL B USE 162584-001 5513,23
FOR PAL M USE 162584-002 5514,24
② FOR STANDARD PAL; 5513,14
DELETE PULSE CROSS BOARD 162586-001 & CONNECT V-IN TO V-OUT & H-IN TO H-OUT.
CHANGE SWITCH BOARD 162607-007 TO 162607-004.
CHANGE POT MTG. BD. 162608-001 TO 162608-003. JUMPER E TO E ON BD. 162553-001
NOTES; 1 SHADED AREAS REPRESENT MODULES

USED ON	NEXT ORDER
5500	

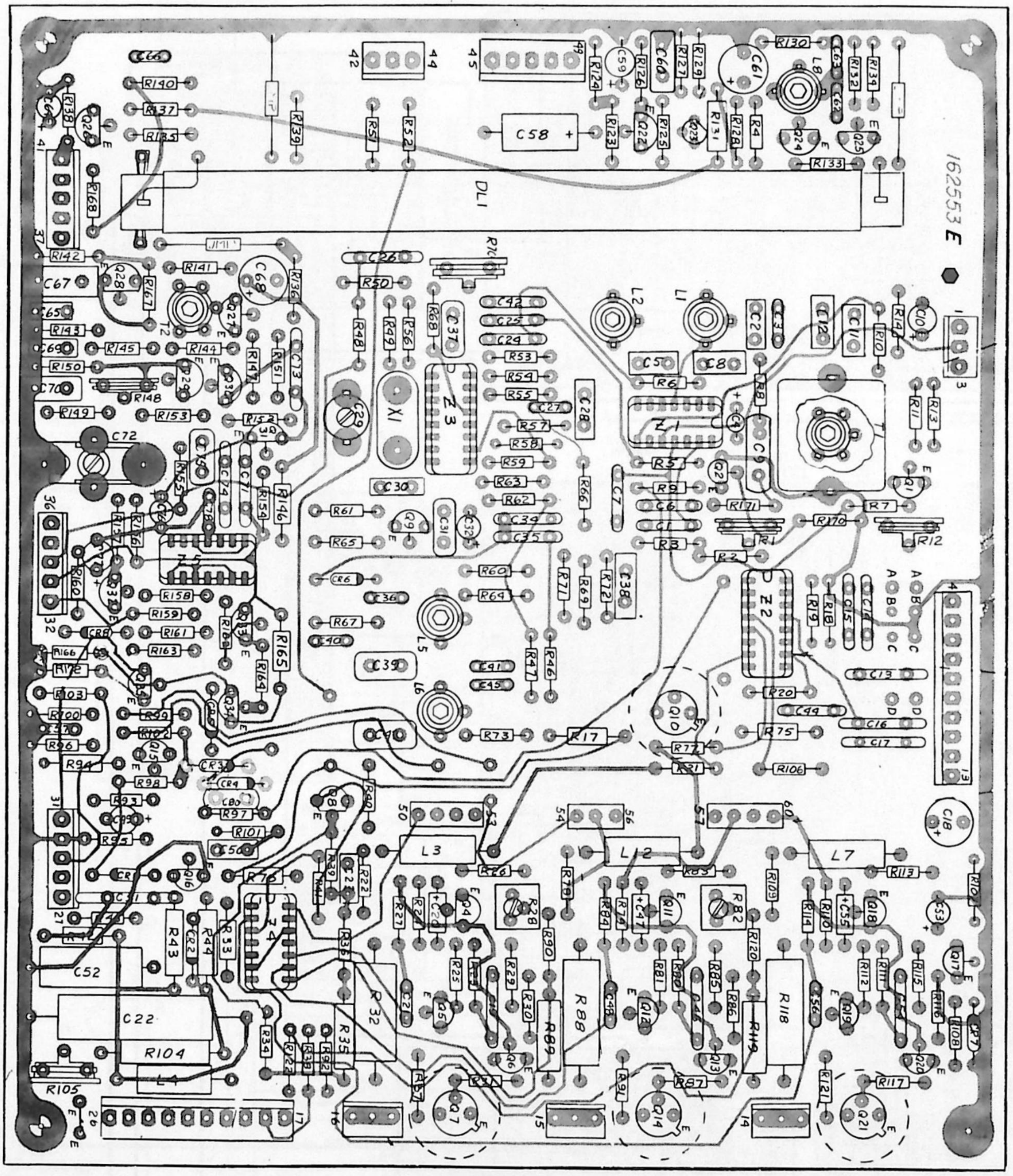
DRAWING DISTR	
1	T
3	M
7 8	A
8	TS
9	

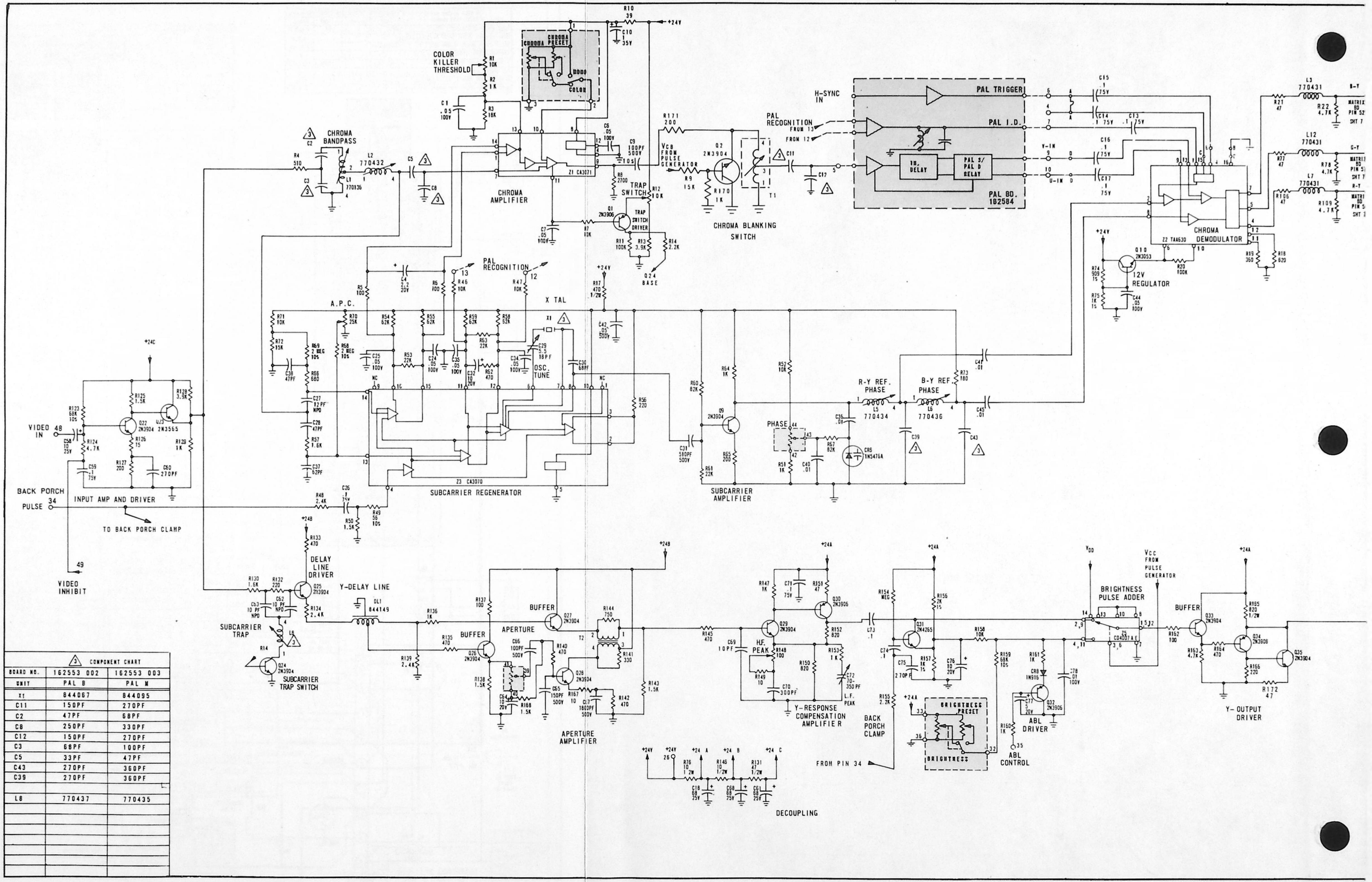
CONRAC
CONRAC DIVISION

TITLE
SYSTEM DIAGRAM
PAL B , PAL M
5513,5514,5523,5524

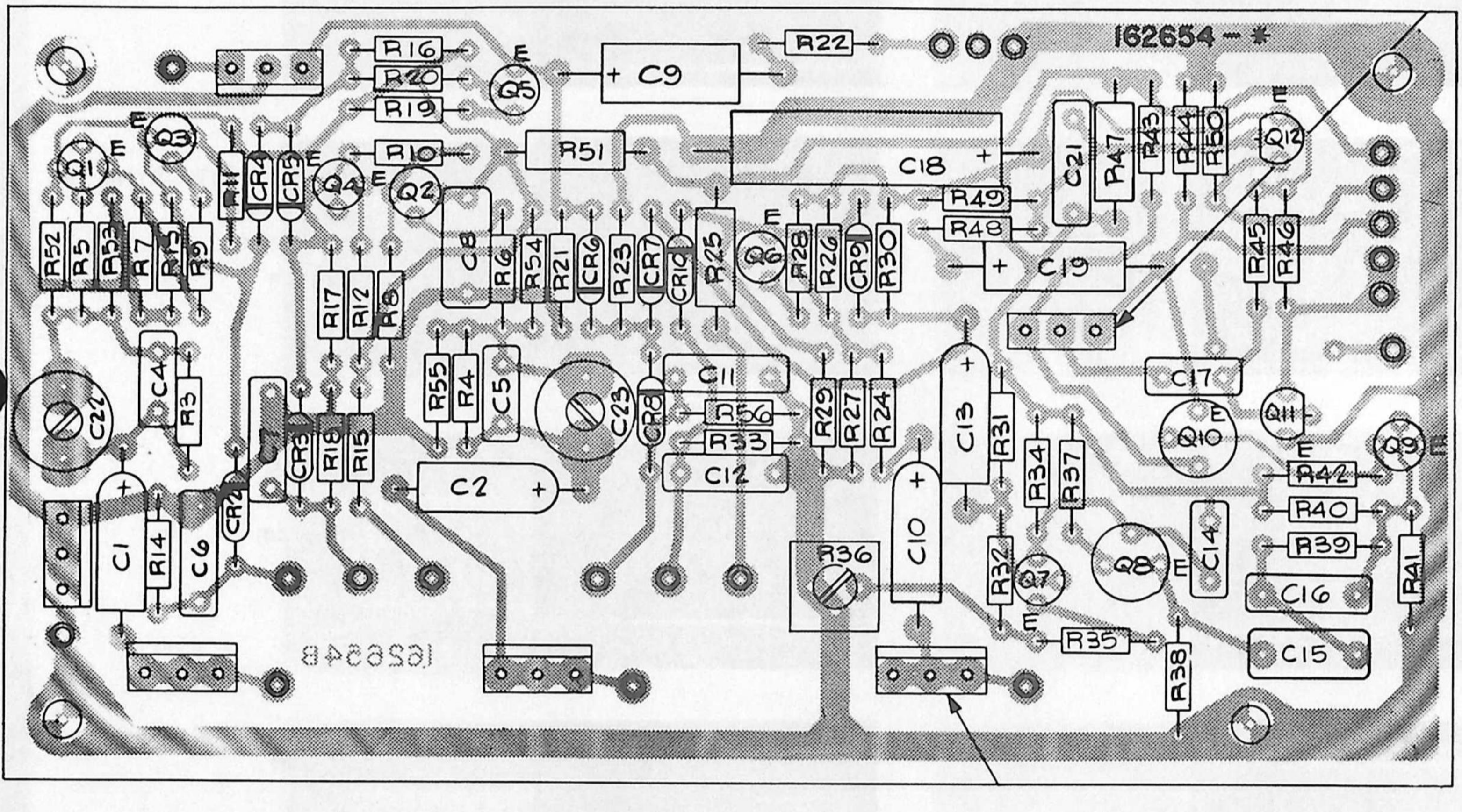
	NAME	DATE
DRAWN BY	D.LANGE	11-15-74
CHECKED BY		
APPROVED		

PART NUMBER
452607

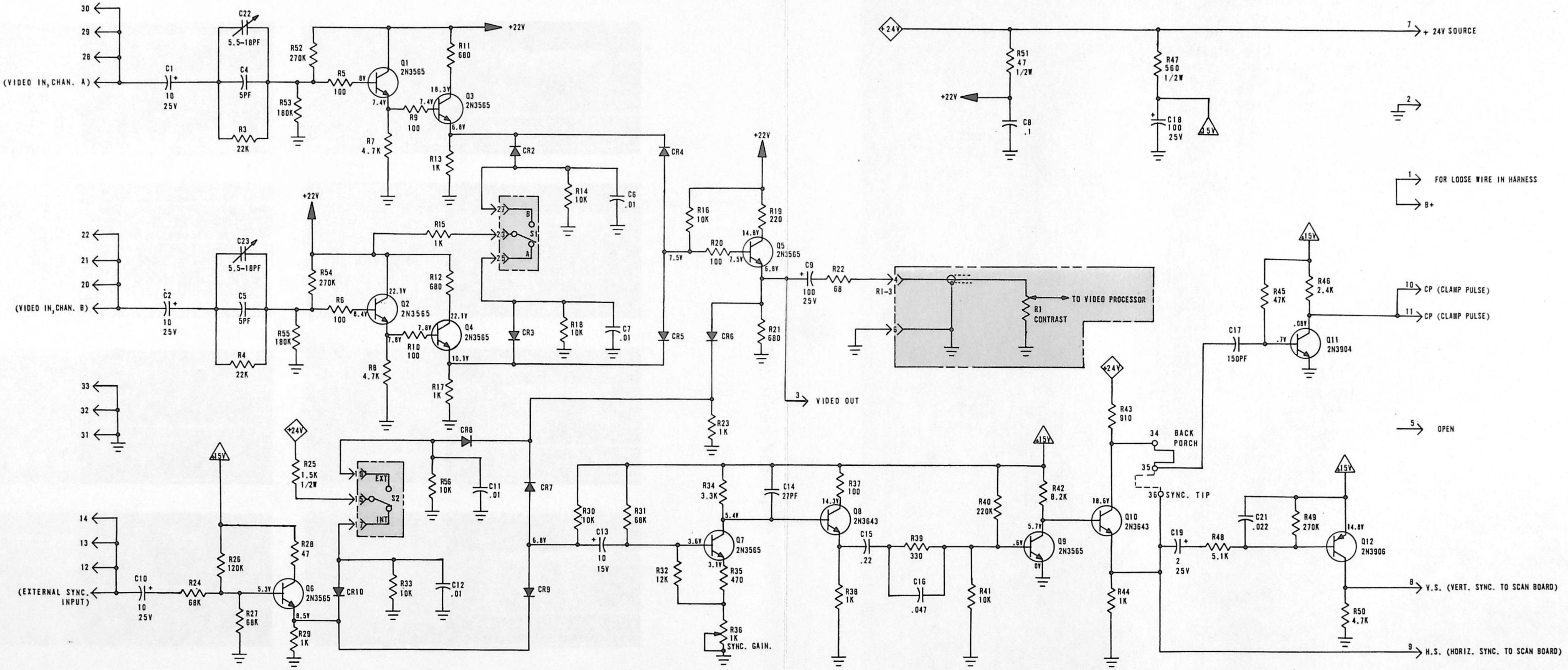

162553 E
DL1
C58
C60
C61
C59
L8
R130
R124
R126
R127
R129
R132
R134
R123
R125
R131
R128
R4
R133
Q22
Q23
Q24
Q25
42
44
45
49
R51
R52
R39
C66
R140
R137
R135
R138
Q26
C64
41
R168
37
R142
JMP1
R141
C68
R136
C67
Q28
R167
T2
Q27
C65
R143
C69
R145
R144
R147
R151
C13
R150
Q29
Q30
C70
R148
R149
R153
R152
Q31
C72
R155
C74
C71
R154
R146
36
R160
R157
R156
R158
R159
R161
R163
R162
R165
R164
32
C88
R166
R172
R103
R100
R96
R94
Q15
R99
R102
CR3
R98
R93
CR4
C80
R97
C95
R95
R101
C50
31
CR1
Q16
C51
27
R43
R44
C23
R33
C52
C22
R104
L4
R105
20
17
16
15
14
C26
R50
R48
R49
R56
R68
C37
Z3
X1
C29
C30
R61
R65
Q9
C31
C32
CR6
C36
R67
C40
C39
L5
L6
C42
C25
C24
R53
R54
R55
C27
C28
R57
R58
R59
R63
R62
C39
C35
R66
C7
R60
R64
R77
R69
R72
C38
R47
R46
C41
C45
C43
R73
R17
R90
Q8
R29
R79
R22
C21
R36
R27
R24
C20
Q4
R28
R25
R23
R26
R29
R30
R90
R89
R88
C46
Q6
Q7
R87
R91
R38
R92
R34
R35
R32
Z4
R70
L2
L1
C2
C3
R12
C11
R14
Q10
C5
C8
R6
R8
Z1
C4
C9
R5
R9
C6
C1
R3
R2
R171
R170
R7
R1
R12
R11
R13
T1
Q2
Q1
Z2
R19
R18
C15
C14
A
B
C
D
C13
C16
C17
C49
R20
R75
Q10
R77
R21
R106
C18
50
53
54
56
57
60
L3
L12
L7
R26
R78
R83
R109
R113
R107
R84
R74
C47
Q11
R82
R80
R81
R85
R86
R120
R114
R110
C55
Q18
C53
R112
R111
R115
R116
R108
Q17
R118
R119
C56
R19
Q19
Q20
Q12
Q13
R117
R121
Q14
Q21
E
+
4
1
3



△3 COMPONENT CHART		
BOARD NO.	162553 002	162553 003
UNIT	PAL B	PAL M
X1	844067	844095
C11	150PF	270PF
C2	47PF	68PF
C8	250PF	330PF
C12	150PF	270PF
C3	68PF	100PF
C5	33PF	47PF
C43	270PF	360PF
C39	270PF	360PF
L8	770437	770435


R16
R20
R19
R10
E
Q5
+ C9
R22
162654 — *
Q3
E
Q1
E
R11
CR4
CR5
E
Q4
E
Q2
R51
C18
+
C21
R47
R43
R44
R50
Q12
R49
R48
R52
R5
R53
R7
R13
R9
C8
R6
R54
R21
CR6
R23
CR7
CR10
R25
E
Q6
R28
R26
CR9
R30
+
C19
R45
R46
R17
R12
R8
C4
R3
C22
R55
R4
C5
C23
CR8
C11
R56
R33
C12
R29
R27
R24
+
C13
R31
C17
Q11
E
Q10
E
Q9
E
R42
R40
R39
R41
R34
R37
C14
Q8
E
CR3
R18
R15
C2
+
CR2
+
C1
R14
C6
R36
+
C10
R32
Q7
E
R35
R38
C16
C15
162654B

REV	ECO	DESCRIPTION	DFT	CHKD	APPD.	DATE
A		NEW DWG.				8-7-75
B	5912	REVISED DESIGNATORS.				8-21-75
C	6228	C4 AND C5 WERE 15PF				4/6/76
D	10135	R19 WAS 470 Ω	S.H			



5. SHADED AREA INDICATES ITEM LOCATED OFF BOARD.
4. ALL DIODES ARE 1N916.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL RESISTOR VALUES ARE IN OHMS, ± 5% 1/4W.
1. JUMPER PLUG FOR BACK PORCH OR SYNC. TIP CLAMP SELECT.
NOTES: (UNLESS OTHERWISE SPECIFIED)

DUAL CHANNEL VIDEO INPUT MODULE
BOARD NO. 162654, REV. D, DATED 8-26-76

Symbol	Description	Conrac Part No.

DUAL CHANNEL VIDEO INPUT BOARD 162654-001 PARTS LIST

CAPACITORS

C1, C2, C10, C13	10µF, Electrolytic, 25V	211460
C4, C5	5pF, Dipped Mica, 500V, ± 5%	210035
C6, C7, C11, C12	.01µF, Molded Polyester, 630V, ± 10%	211146-103
C8	.1µF, Molded Polyester, 100V, ± 10%	211149-104
C9	100µF, Electrolytic, 15V	211605-001
C14	27pF, Ceramic Disc, 500V, ± 5%	210130
C15	.22µF, Molded Polyester, 100V, ± 10%	211150-224
C16	.047µF, Molded Polyester, 250V, ± 10%	211148-473
C17	150pF, Dipped Mica, 500V, ± 5%	210375
C18	100µF, Electrolytic, 25V	211615
C19	2µF, Electrolytic, 25V	211365
C21	.022µF, Molded Polyester, 400V, ± 10%	211147-223
C22, C23	5.5-18pF, Trimmer	211845

DIODES

CR2-CR10	Switching (1N916)	206105

RESISTORS

Except as listed below, all resistors on this board are replaceable by 1/4W, ± 5%, carbon film units. For exact value, see schematic diagram.

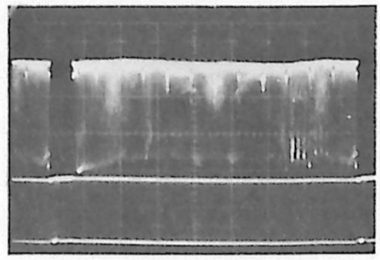
R25	1500 ohms, Carbon Film, $\frac{1}{2}$W, ± 5%	201332-152
R36	Potentiometer, 1000 ohms	928490-102
R47	560 ohms, Carbon Film, $\frac{1}{2}$W, ± 5%	201332-561
R51	47 ohms, Carbon Film, $\frac{1}{2}$W, ± 5%	201332-470

TRANSITORS

Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9	NPN (2N3565)	207175
Q8, Q10	NPN (2N3643)	207205
Q11	NPN (2N3904)	207227
Q12	PNP (2N3906)	207228

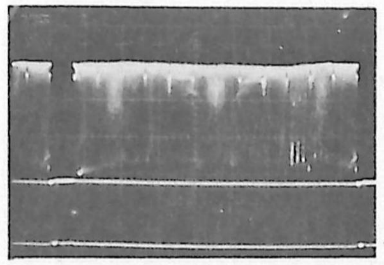
MISCELLANEOUS

	Terminal Wafer, 3-Pin	886198-003
	Terminal Wafer, 3-Pin	886147-003
	Terminal	886145-002
	Connector Housing	886197-002



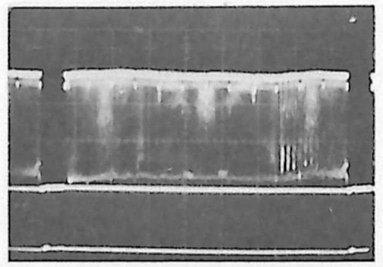
Q1 BASE

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



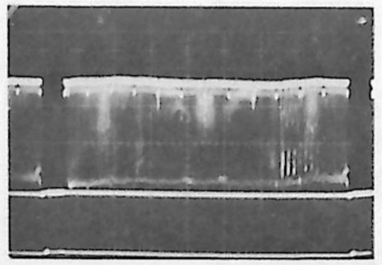
Q3 EMITTER

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



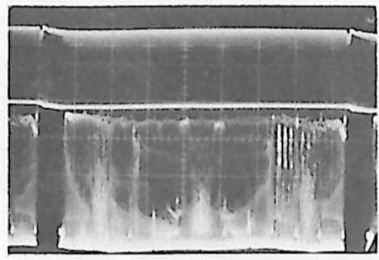
Q5 EMITTER

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



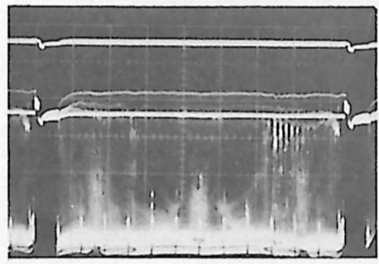
Q7 BASE

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



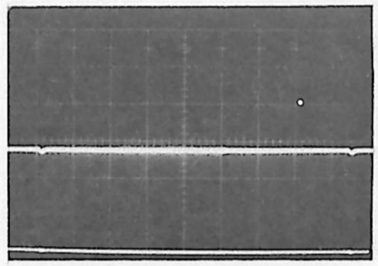
Q7 COLLECTOR

HORIZ = 2 msec/cm
VERT = 0.5 V./cm



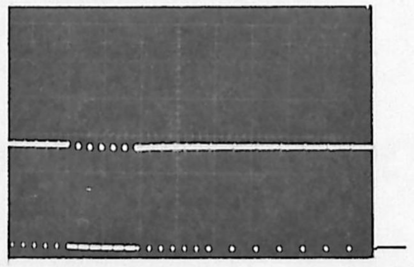
Q9 BASE

HORIZ = 2 msec/cm
VERT = 0.5 V./cm



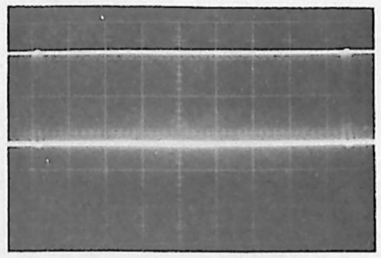
Q9 COLLECTOR

HORIZ = 2 msec/cm
VERT = 5 V./cm



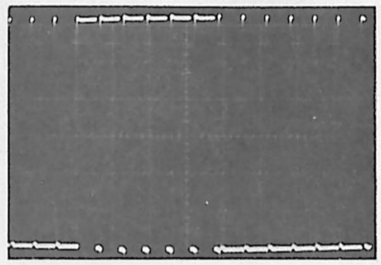
Q9 COLLECTOR

HORIZ = 100 μsec/cm
VERT = 5 V./cm



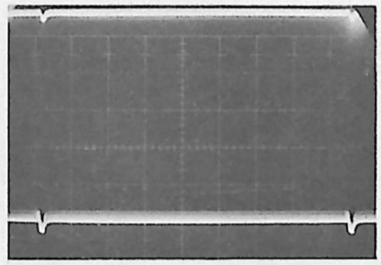
Q10 COLLECTOR

HORIZ = 2 msec/cm
VERT = 5 V./cm



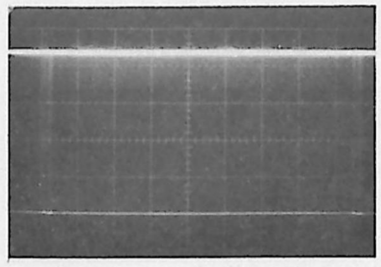
Q10 COLLECTOR

HORIZ = 50 μsec/cm
VERT = 2 V./cm



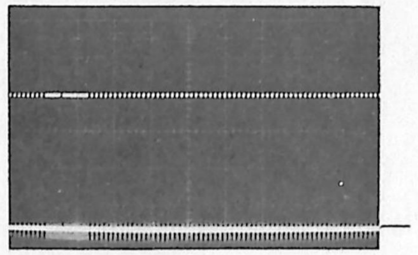
Q10 EMITTER

HORIZ = 2 msec/cm
VERT = 2 V./cm



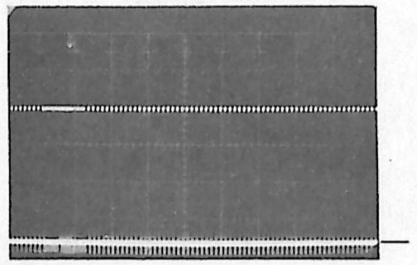
HORIZ = 2 msec/cm
VERT = 2 V./cm

Q11 BASE



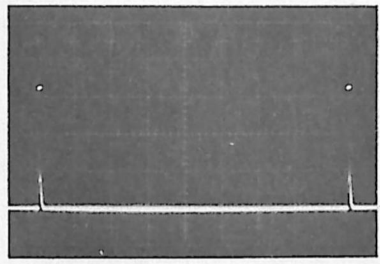
Q11 COLLECTOR

HORIZ = 500 μsec/cm
VERT = 0.2 V./cm



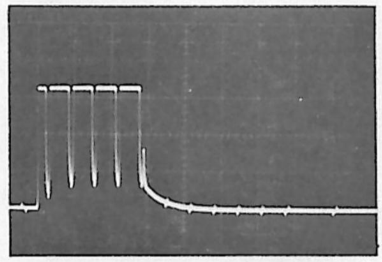
Q11 COLLECTOR WITH SYNC TIP

HORIZ = 500 μsec/cm
VERT = 0.2 V./cm



Q11 COLLECTOR

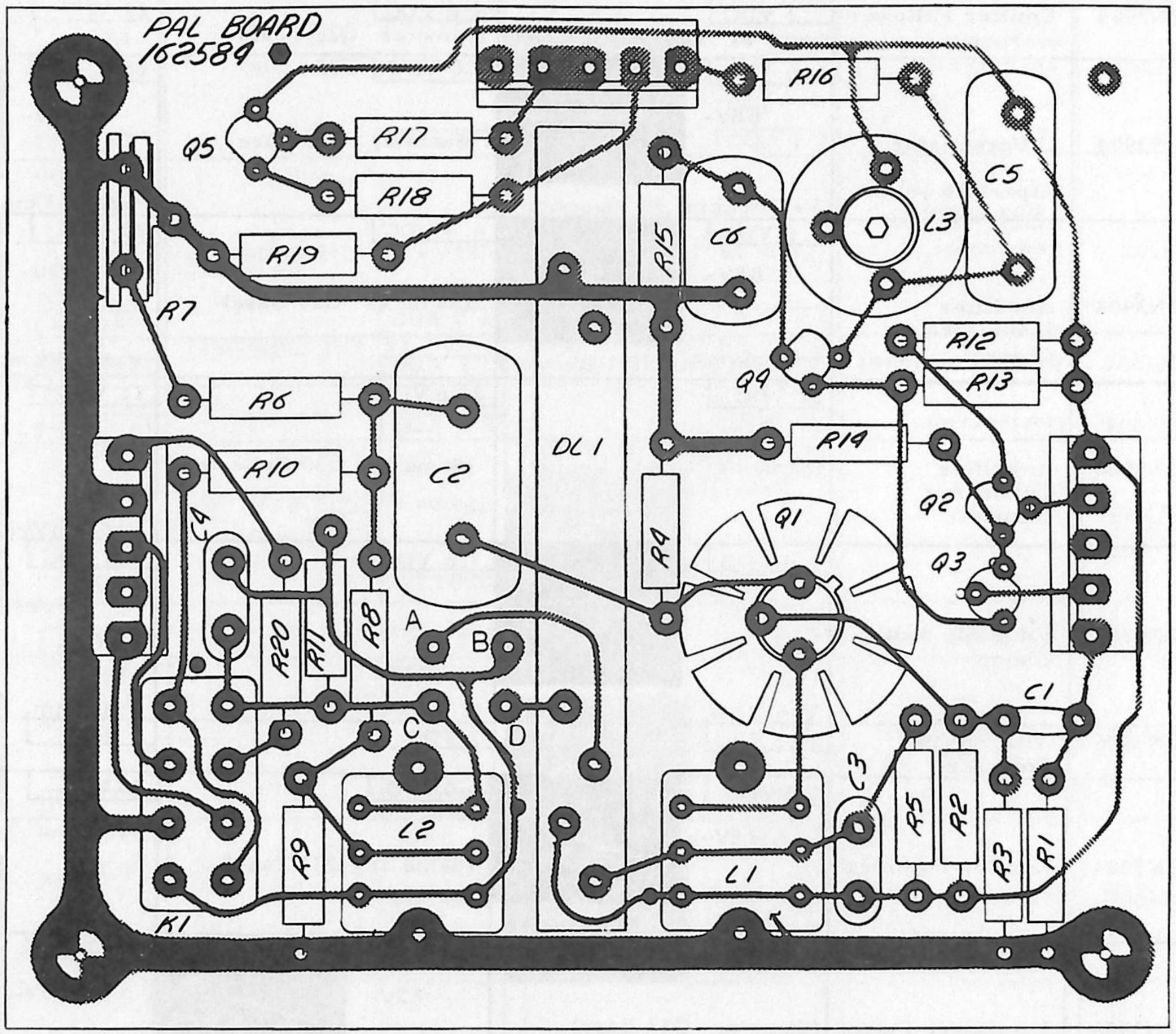
HORIZ = 2 msec/cm
VERT = 5 V./cm



Q11 COLLECTOR

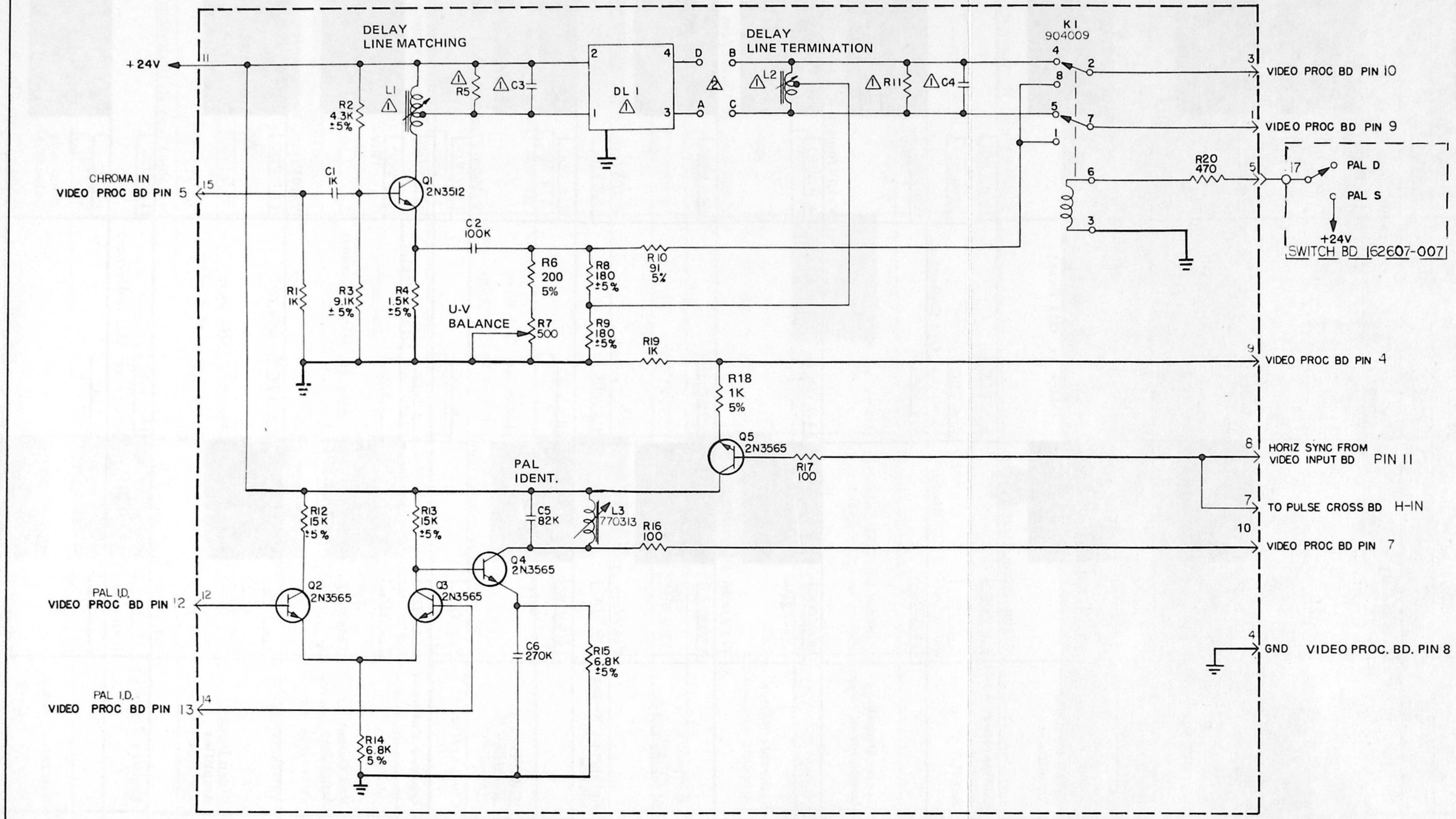
HORIZ = 50 μsec/cm
VERT = 5 V./cm

NOTE: PHOTOS TAKEN USING BACK PORCH (RATHER THAN SYNC TIP) CLAMP.


PAL BOARD
162584
Q5
R17
R18
R19
R16
C5
L3
C6
R15
R7
R6
R10
C2
DL 1
R12
R13
Q9
R14
Q2
Q3
Q1
R4
C4
R20
R11
R8
A
B
C
D
C1
C3
R5
R2
R3
R1
L1
L2
R9
K1

162584

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DWG			12-3-78
B	4455	R5 & 11 (-002 CONFIG) WERE 1/2W			12-13-7
C	4578	R5 & R11 (-002) WERE 1/8 W			
D	5329	R6 WAS 120. -001 R11 WAS 383, 1% -002 R5 & R11 WAS 562, 1%			
E	5392	REVISED PIN NOS			
F		R8 WAS 1.8K			



COMPONENT CHART ⚠

BOARD NO.	UNIT	DL 1	L1	L2	C3	C4	R5	R11
162584-002	PAL M	63.48 ±.005 µs	770355	770356	150, 5%	47, 5%	287, 1%	301, 1%
162584-001	PAL B	63.943 ±.005	770353	770353	180, 5%	27, 5%	383, 1%	475, 1%

4. ALL CAPACITORS VALUES ARE IN PICOFARADS ±10%.
3. ALL RESISTORS VALUES ARE IN OHMS ±10%, 1/2 W.
2. DL1 —— JUMPER NOTE – PAL B 162584-001 (D TO C & A TO B) PAL M 162584-002. (D TO B & A TO C).
⚠ FOR VALUES REFER TO COMPONENT CHART.
NOTE: UNLESS OTHERWISE SPECIFIED.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR.
1 9
3 T
4A M
7B
8

USED ON 5100,5500
NEXT DRW.

TOLERANCE UNLESS OTHERWISE SPECIFIED:
.XX ± .03
.XXX ± .010
ANGULAR: ± 1°

MATERIAL:
FINISH

CONRAC
CONRAC DIVISION

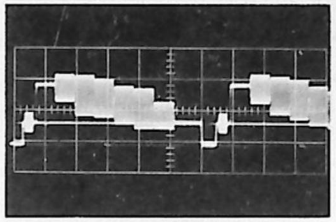
TITLE:
SCHEMATIC,
PAL BOARD

	NAME	DATE
DRAWN BY:		
CHECKED BY:		
APPROVED:		2-3-73

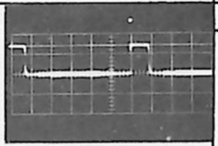
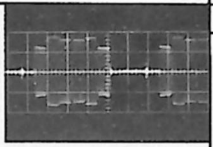
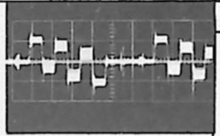
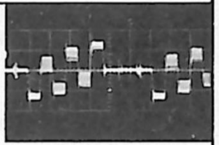
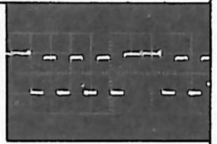
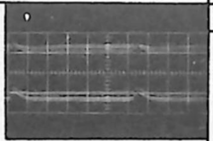
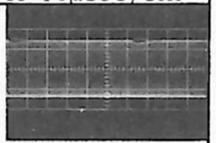
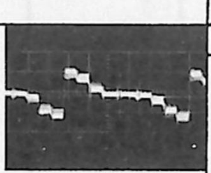
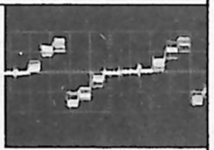
PART NUMBER
162584

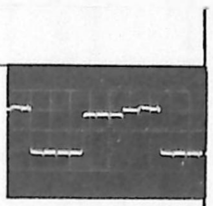
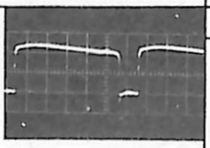
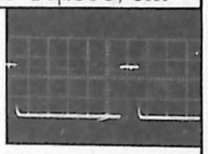
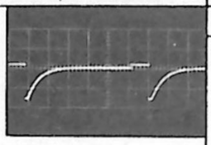
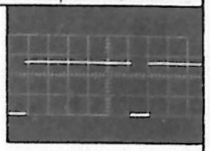
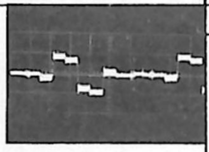
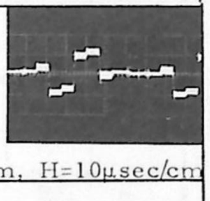
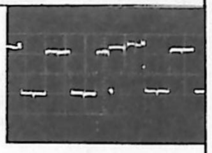
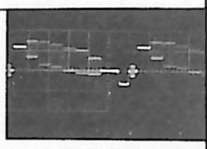
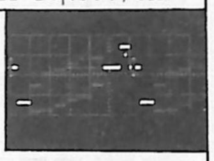
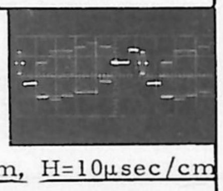
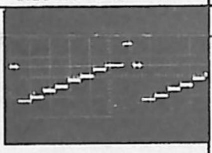
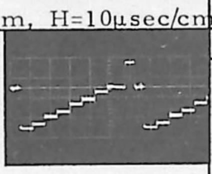
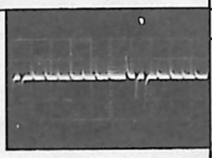
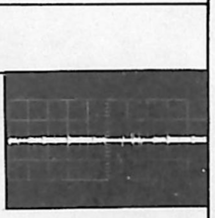
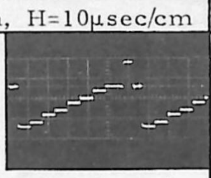
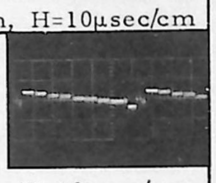
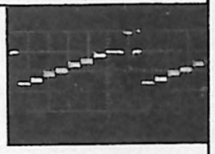
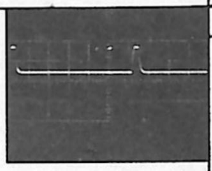
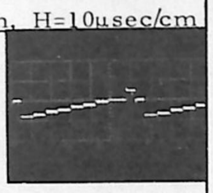
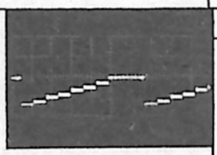
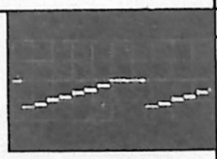
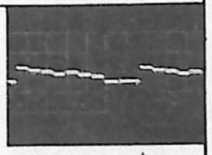
VIDEO PROCESSOR BOARD NO. 162553

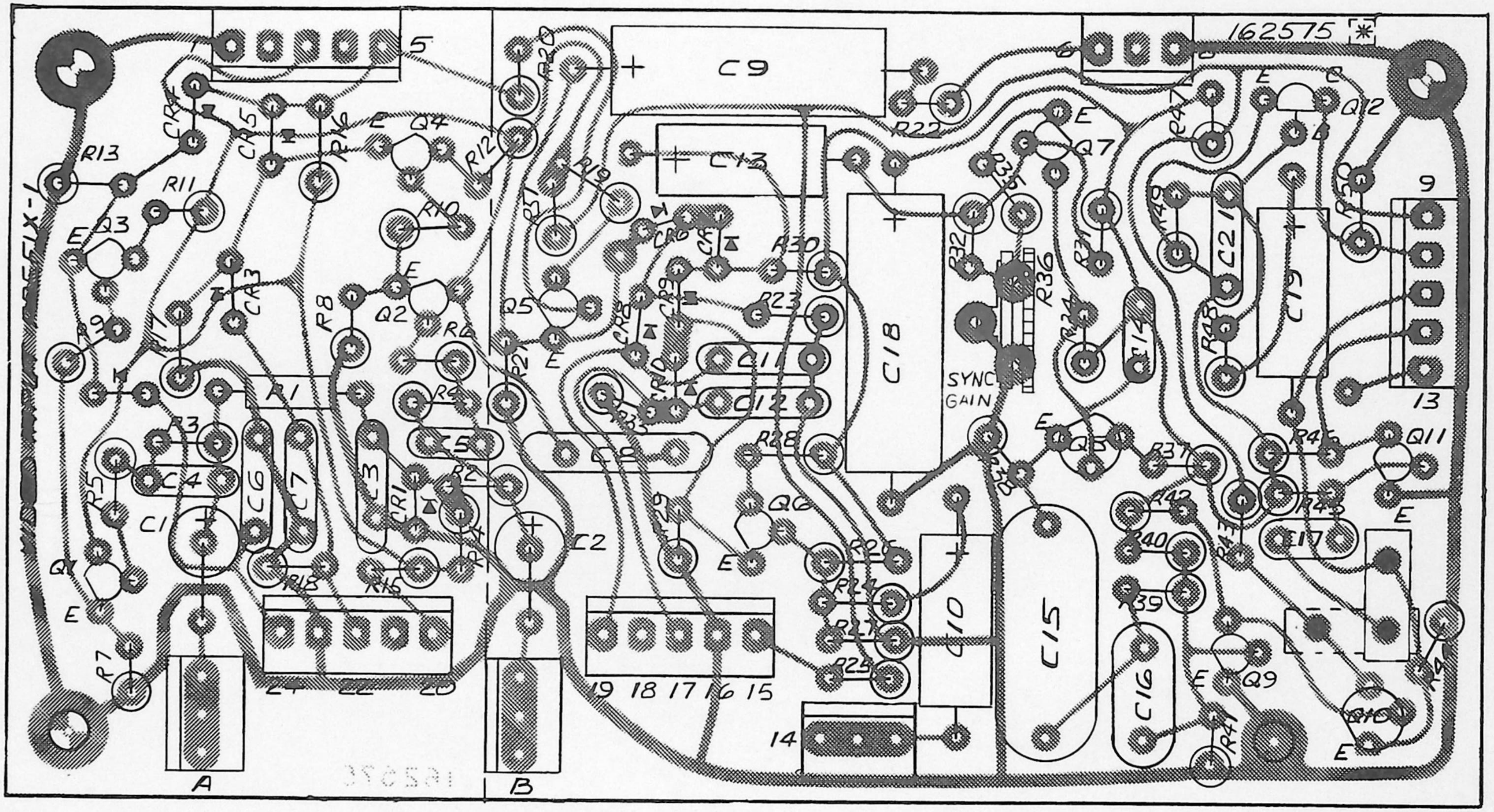
TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 voltmeter. All monitor controls adjusted for normal operation.



Standard Color Bar Test Input Signal:

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3906	Saturable Switch 3.58MHz Trap	Color 15V, Mono 20V	16.5 VDC Varies with R12	Color 6V, Mono 2V
Q2	2N3904	Chroma Blanking	0.1 VDC  V=500mV/cm, H=10µsec/cm	0 VDC  V=200mV/cm, H=10µsec/cm	ground Ground
Q4	2N3906	Blue Chroma Amplifier	19.5 VDC  V=200mV/cm, H=10µsec/cm	20.0 VDC (Same as Q4 Base)	8.2 VDC  V=500mV/cm, H=10µsec/cm
Q5	2N3904	Comparator	9.0 VDC	8.6 VDC	19.5 VDC
Q6	2N3904	Emitter Follower	8.2 VDC (Same as Q4 Collector)	7.6 VDC (Same as Q4 Collector)	22 VDC
Q7	39393	Output Amplifier Blue	7.6 VDC (Same as Q4 Collector)	7.0 VDC (Same as Q4 Collector)	150 VDC  V=10V/cm, H=10µsec/cm
Q9	2N3904	Subcarrier Amplifier	1.5VDC  V=.5V/cm, H=10µsec/cm	1.1VDC (Same as Q9 Base)	11.0 VDC  V=1V/cm, H=10µsec/cm
Q10	2N3053	12V Regulator Pass Transistor	12.5 VDC	12.0 VDC	24.0 VDC
Q11	2N3904	Green Chroma Amplifier	19.5 VDC  V=100mV/cm, H=10µsec/cm	20.0 VDC (Same as Q11 Base)	8.2 VDC  V=200mV/cm, H=10µsec/cm
Q12	2N3904	Comparator	9.1 VDC	8.6 VDC	19.0 VDC

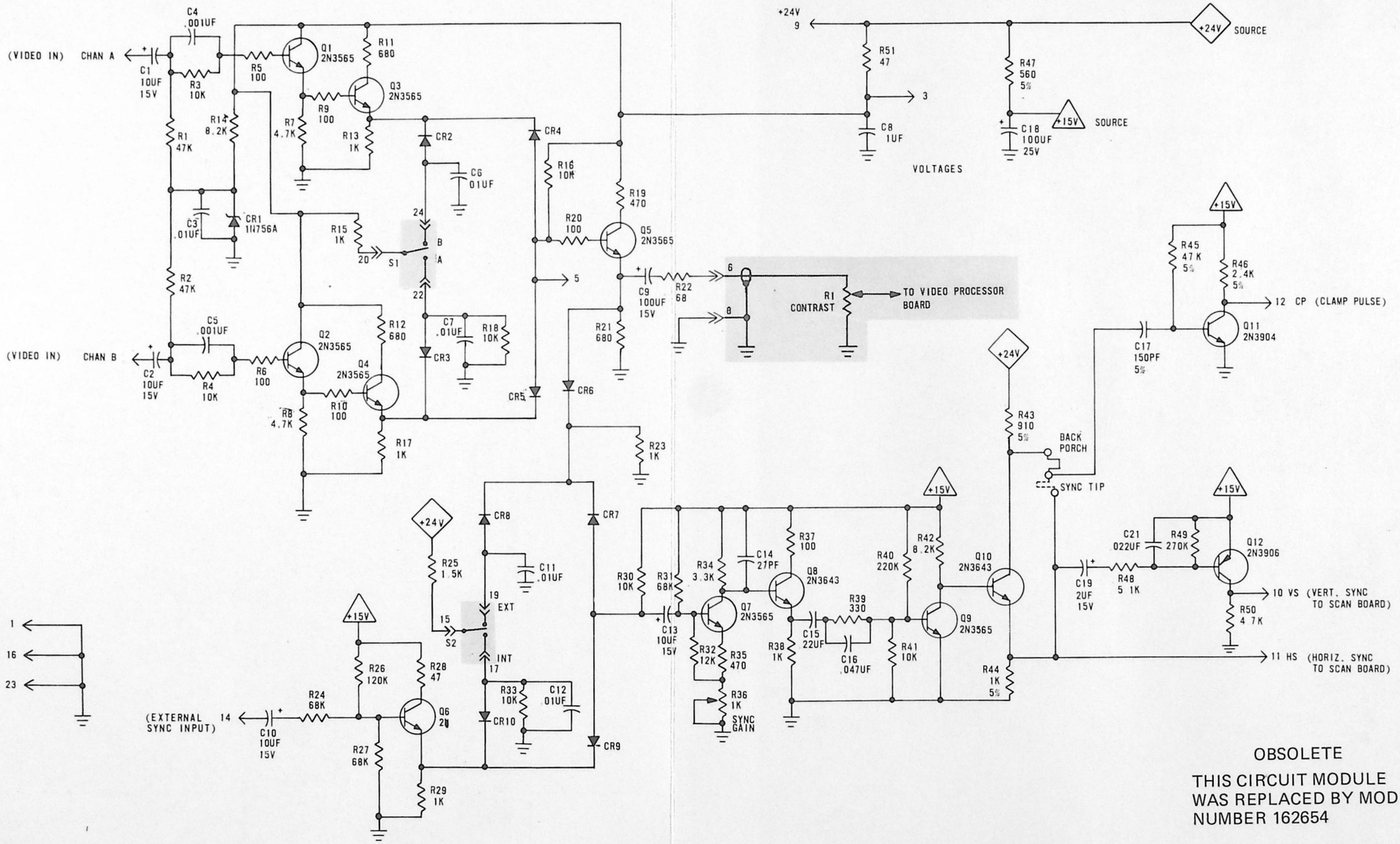
Q13	2N3904	Emitter Follower	8.2 VDC (Same as Q11 Collector)	7.8 VDC Same as Q11 Collector	22 VDC
Q14	39393	Green Output Amplifier	7.8 VDC (Same as Q11 Collector)	7.2 VDC (Same as Q11 Collector)	150 VDC 150V–  V=10V/cm, H=10µsec/cm
Q15	2N3906	Saturable Switch	25.0 VDC 24V–  V=1V/cm, H=10µsec/cm	24.0 VDC	4.0 VDC 0V–  V=10V/cm, H=10µsec/cm
Q16	2N3904	Blanking Output	0 VDC 0V–  V=5V/cm, H=10µsec/cm	0 VDC Ground	20.5 VDC 0V–  V=10V/cm, H=10µsec/cm
Q17	2N3904	Reference Voltage Source	8.6 VDC	9.2 VDC	23.0 VDC
Q18	2N3906	Red Chroma Amplifier	19.5 VDC 19.5V–  V=100mV/cm, H=10µsec/cm	20.0 VDC (Same as Q18 Base)	8.4 VDC 8.4V–  V=200mV/cm, H=10µsec/cm
Q19	2N3904	Comparator	9.1 VDC	8.6 VDC	19.0 VDC
Q20	2N3904	Emitter Follower	8.4 VDC (Same as Q18 Collector)	7.8 VDC (Same as Q18 Collector)	22.0 VDC
Q21	39393	Red Output Amplifier	7.8 VDC (Same as Q18 Collector)	7.2 VDC (Same as Q18 Collector)	150 VDC 150V–  V=10V/cm, H=10µsec/cm
Q22	2N3904	Video Input Amplifier	1.2 VDC 1.2V–  V=100mV/cm, H=10µsec/cm	0.6 VDC (Same as Q22 Base)	17.0 VDC 17V–  V=500mV/cm, H=10µsec/cm
Q23	2N3565	Emitter Follower	17 VDC (Same as Q22 Collector)	16.2 VDC (Same as Q22 Collector)	21.5 VDC
Q24	2N3904	Saturable Switch	Color 0.7V, Mono 0V	0 VDC Ground	0 VDC 0V–  Mono only Color 0VDC V=500mV/cm, H=10µsec/cm
Q25	2N3904	Emitter Follower	16 VDC 16V–  V=500mV/cm, H=10µsec/cm	15.4 VDC (Same as Q25 Base)	21 VDC
Q26	2N3904	Emitter Follower	7.2 VDC 7.2V–  V=200mV/cm, H=10µsec/cm	6.6 VDC (Same as Q26 Base)	22 VDC
Q27	2N3904	Emitter Follower	7.2 VDC (Same as Q26 Base)	6.6 VDC (Same as Q26 Base)	22 VDC
Q28	2N3904	Differentiator (Aperture set at Maximum)	6.6 VDC 6.6V–  V=50mV/cm, H=10µsec/cm	6.0 VDC (Same as Q28 Base)	22 VDC 22V–  V=200mV/cm, H=10µsec/cm
Q29	2N3904	Amplifier Luminance Channel	6.6 VDC 6.6V–  V=200mV/cm, H=10µsec/cm	6.0 VDC (Same as Q29 Base)	22 VDC 22V–  V=50mV/cm, H=10µsec/cm
Q30	2N3906	Amplifier Luminance Channel	22 VDC (Same as Q29 Collector)	22.6 VDC (Same as Q30 Collector)	11 VDC 11V–  V=500mV/cm, H=10µsec/cm
Q31	2N4265	Saturable Switch Clamp	2.0 VDC 0V–  V=5V/cm, H=10µsec/cm	7.6 VDC	7.5 VDC 7.5V–  V=1V/cm, H=10µsec/cm
Q32	2N3906	ABL Emitter Follower	13.5 VDC	7 VDC	0 VDC Ground
Q33	2N3904	Emitter Follower	7.5 VDC 7.5V–  V=1V/cm, H=10µsec/cm	7.0 VDC (Same as Q33 Base)	23 VDC
Q34	2N3906	Luminance Output Driver Emitter Follower	7.0 VDC (Same as Q33 Base)	7.2 VDC 7.2V–  V=1V/cm, H=10µsec/cm	0.7 VDC .7V–  V=50mV/cm, H=10µsec/cm
Q35	2N3904	Luminance Output Driver Current Amplfier	0.7 VDC (Same as Q34 Collector)	0VDC Ground	7.2 VDC (Same as Q34 Emitter)


PREFIX-1
162575
A
B
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C21
CR1
CR3
CR4
CR5
CR6
CR8
CR9
CR10
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R39
R40
R41
R42
R43
R44
R45
R46
R47
R48
R49
R50
R51
SYNC GAIN
E
1
5
6
9
13
14
15
16
17
18
19
20
22
24

162575

162575

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
C.	4967	REDRAWN (NO CHANGES)			



OBSOLETE

THIS CIRCUIT MODULE
WAS REPLACED BY MODULE
NUMBER 162654

5. SHADED AREA INDICATED ITEM LOCATED OFF BOARD
4 ALL DIODES ARE PG912
3 ALL CAPACITOR VALUES ARE IN MICROFARADS
2. ALL RESISTOR VALUES ARE IN OHMS, ±10% ½W
1. JUMPER PLUG FOR BACK PORCH OR SYNC TIP CLAMP SELECTION
NOTES: UNLESS OTHERWISE SPECIFIED

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR		USED ON	NEXT DRW
1	TS	5100/5500	
3	M		
7B	A		
8A			
9			

TOLERANCE
UNLESS OTHERWISE
SPECIFIED -
XX ± .03
XXX ± .010
ANGULAR: ± 1°

MATERIAL

FINISH

CONRAC

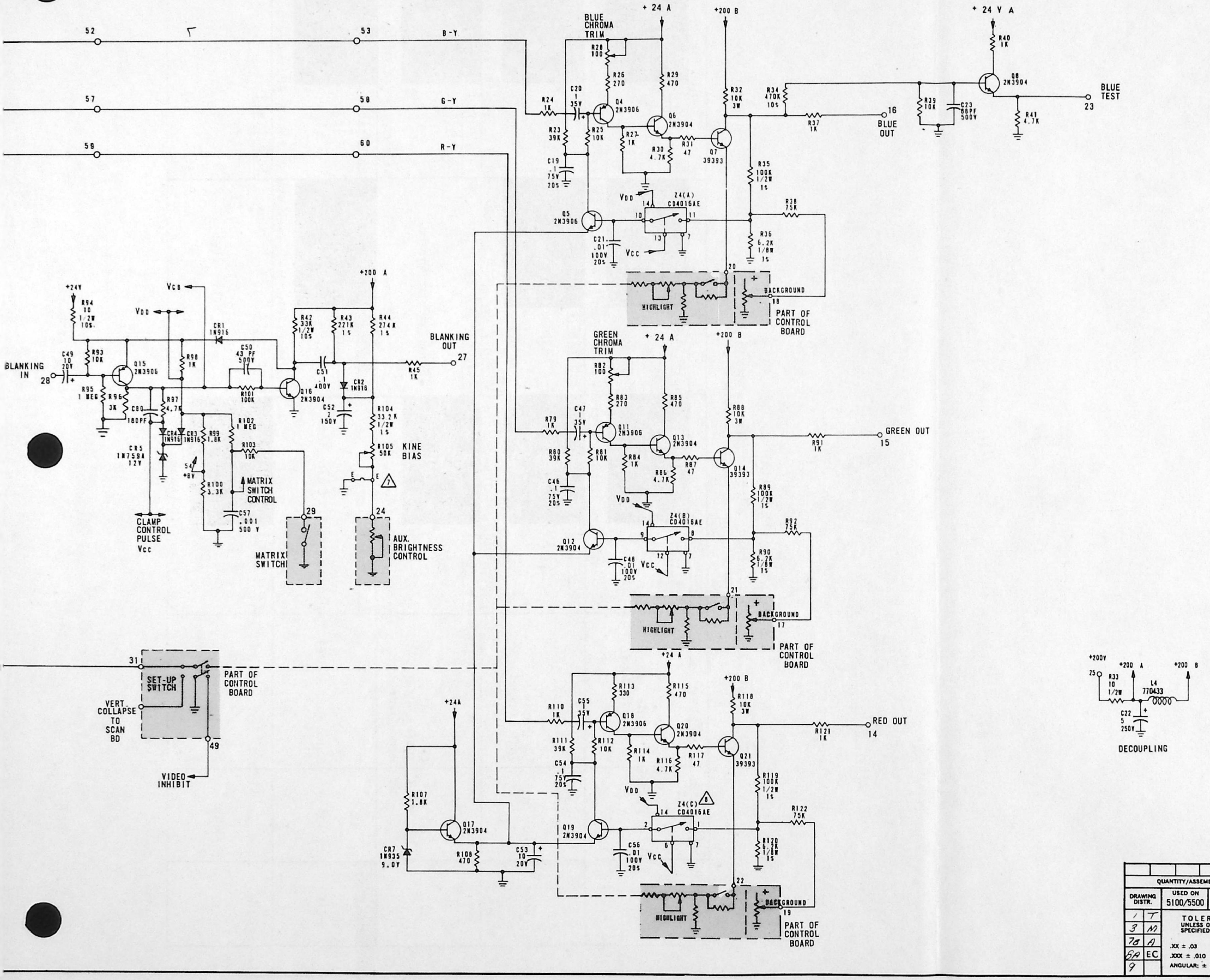
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE
SCHEMATIC, DUAL CHANNEL
VIDEO INPUT BOARD

	NAME	DATE
DRAWN BY	E.J. SPRAGUE	7-16-74
CHECKED BY		
APPROVED		

PART NUMBER
162575

162553	REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
	A		NEW DRAWING			1/24/74
	B	4689	REVISED R104, R43, R49			3-28-74
	C	5107	REVISED NOTES, R107 WAS 1K, C50 WAS 10PF, CR7 WAS IN960. ADDED C 80 180PF			10-9-74



6. CONNECT Z4 PINS 3,4 AND 5 TO GROUND (Z4 PIN 7).

5. JUMPER POINTS E TO E, EXCEPT WHEN H. DELAY AUX BRIGHTNESS CONTROL IS USED.

4 CIRCUITRY IN SHADED AREAS ARE SHOWN FOR FUNCTIONAL REPRESENTATION ONLY. FOR ACTUAL CIRCUIT REFER TO THE APPROPRIATE SCHEMATIC.

3. REFER TO COMPONENT CHART FOR VALUE OF COMPONENTS INDICATED

2. ALL RESISTOR VALUES ARE IN OHMS ± 5%, 1/4W, CARBON COMP, UNLESS OTHERWISE SPECIFIED.

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

NOTES:

					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

DRAWING DISTR.		USED ON	NEXT DRW.	MATERIAL:
		5100/5500		~
1	T	TOLERANCE UNLESS OTHERWISE SPECIFIED:		
3	M			
7B	A	.XX ± .03		FINISH
6A	EC	.XXX ± .010		~
9		ANGULAR: ± 1°		

CONRAC

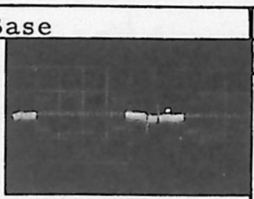
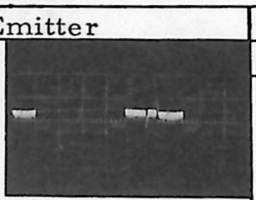
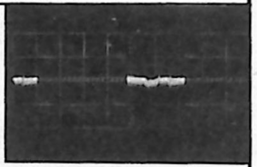
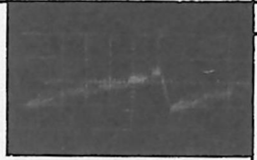
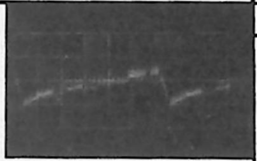
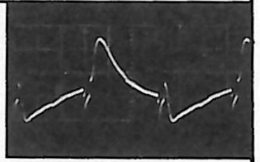
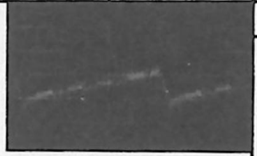
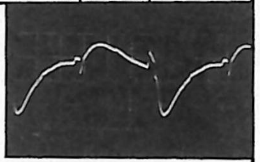
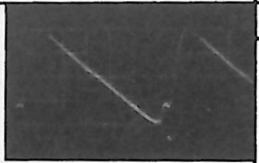
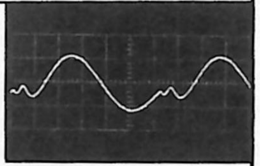
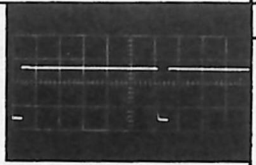
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:
SCHEMATIC
VIDEO PROCESSOR
. BOARD
IN PAL MODELS

	NAME	DATE
DRAWN BY:	D.R. PATCHEN	
CHECKED BY:		1/2/74
APPROVED:		1/24/74
PART NUMBER		
	162553	

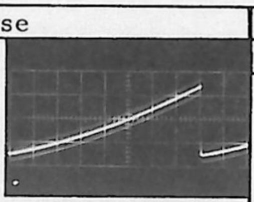
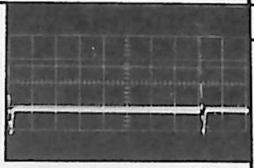
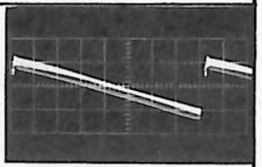
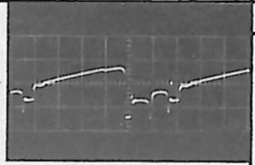
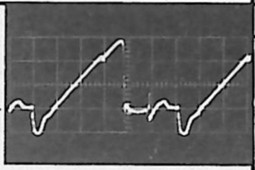
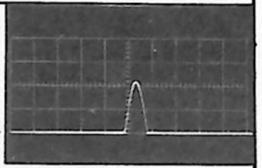
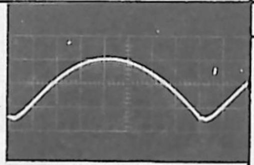
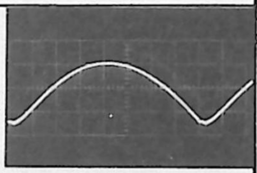
PAL BOARD NO. 162584

TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-Type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3512	Chroma Amplifier Phase Splitter	16.4 VDC 16.4V–  V=50mV/cm, H=10µsec/cm	15.8 VDC 15.8V–  V=50mV/cm, H=10µsec/cm	24.0 VDC 24V–  V=100mV/cm, H=10µsec/cm
Q2	2N3565	One-half Differential Amplifier	8.6 VDC 8.6V–  V=50mV/cm, H=10µsec/cm	8.0 VDC 8.0V–  V=50mV/cm, H=10µsec/cm	16 VDC 16V–  V=1V/cm, H=20µsec/cm
Q3	2N3565	One-half Differential Amplifier	8.6 VDC 8.6V–  V=50mV/cm, H=10µsec/cm	8.0 VDC (Same as Q2 Emitter)	15.0 VDC 15V–  V=1V/cm, H=20µsec/cm
Q4	2N3565	Saturable Switch	15 VDC (Same as Q3 Collector)	15.6 VDC 15.6V–  V=200mV/cm, H=20µsec/cm	24.0 VDC 24V–  V=2V, H=20µsec/cm
Q5	2N3565	Emitter Follower	12.0 VDC  0V– V=5V/cm, H=10µsec/cm	11.4 VDC (Same as Q5 Base)	24.0 VDC

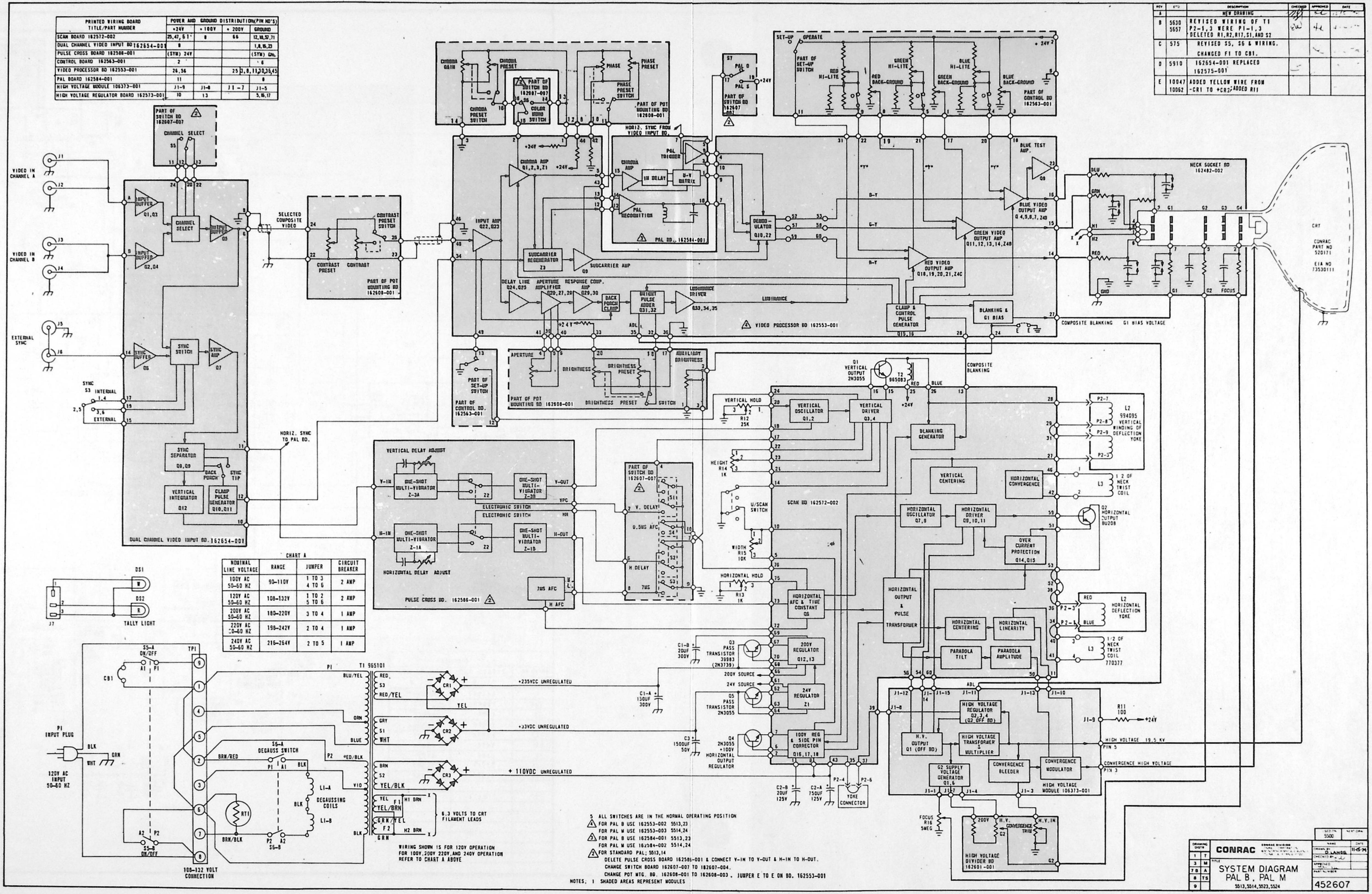
CHASSIS

TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3055	Vertical Output Amplifier	3.5 VDC  0V– V=2V/cm, H=2msec/cm	3.0 VDC  0V– V=1V/cm, H=2msec/cm	21.0 VDC  0V– V=10V/cm, H=2msec/cm
Q2	BU108	Horizontal Output Switch	-0.2 VDC  0V– V=5V/cm, H=10µsec/cm	0.6 VDC  0V– V=1V/cm, H=10µsec/cm	CAUTION: Do Not Meas. DC  0V– V=500V/cm, H=10µsec/cm
Q3	39983	+200V Regulator Pass Element	205 VDC	205 VDC	232 VDC
Q4	2N3055	Horizontal B+ Regulator Pass Element	83.0 VDC  83V– V=1V/cm, H=2msec/cm	82.0 VDC  82V– V=1V/cm, H=2msec/cm	105 VDC
Q5	2N3055	+24V Regulator Pass Element	24.6 VDC	24.0 VDC	34.0 VDC

PRINTED WIRING BOARD TITLE/PART NUMBER	POWER AND GROUND DISTRIBUTION(PIN NO'S)			
	+24V	+100V	+200V	GROUND
SCAN BOARD 162572-002	25,47,61	8	66	12,18,57,71
DUAL CHANNEL VIDEO INPUT BD 162654-001	8			1,8,15,23
PULSE CROSS BOARD 162586-001	(SYM) 24V			(SYM) GND.
CONTROL BOARD 162563-001	2			6
VIDEO PROCESSOR BD 162553-001	26,56		25	3,8,11,30,36,45
PAL BOARD 162584-001	11			8
HIGH VOLTAGE MODULE 106373-001	J1-9	J1-8	J1-7	J1-5
HIGH VOLTAGE REGULATOR BOARD 162573-001	10	13		5,15,17

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING			
B	5630 5657	REVISED WIRING OF T1 P2-1,3 WERE P1-1,3 DELETED R1,R2,R17,S1,AND S2			
C	575	REVISED S5, S6 & WIRING. CHANGED F1 TO CB1.			
D	5910	162654-001 REPLACED 162575-001			
E	10047 10062	ADDED YELLOW WIRE FROM -CR1 TO +CR2; ADDED R11			



WIRING SHOWN IS FOR 120V OPERATION
FOR 100V,200V 220V,AND 240V OPERATION
REFER TO CHART A ABOVE

CHART A

NOMINAL LINE VOLTAGE	RANGE	JUMPER	CIRCUIT BREAKER
100V AC 50-60 HZ	90-110V	1 TO 3 4 TO 6	2 AMP
120V AC 50-60 HZ	108-132V	1 TO 2 5 TO 6	2 AMP
200V AC 50-60 HZ	180-220V	3 TO 4	1 AMP
220V AC 50-60 HZ	198-242V	2 TO 4	1 AMP
240V AC 50-60 HZ	216-264V	2 TO 5	1 AMP

5 ALL SWITCHES ARE IN THE NORMAL OPERATING POSITION
4 FOR PAL B USE 162553-002 5513,23
FOR PAL M USE 162553-003 5514,24
3 FOR PAL B USE 162584-001 5513,23
FOR PAL M USE 162584-002 5514,24
2 FOR STANDARD PAL; 5513,14
DELETE PULSE CROSS BOARD 162586-001 & CONNECT V-IN TO V-OUT & H-IN TO H-OUT.
CHANGE SWITCH BOARD 162607-007 TO 162607-004.
CHANGE POT MTG. BD. 162608-001 TO 162608-003 . JUMPER E TO E ON BD. 162553-001
NOTES; 1 SHADED AREAS REPRESENT MODULES

USED ON 5500

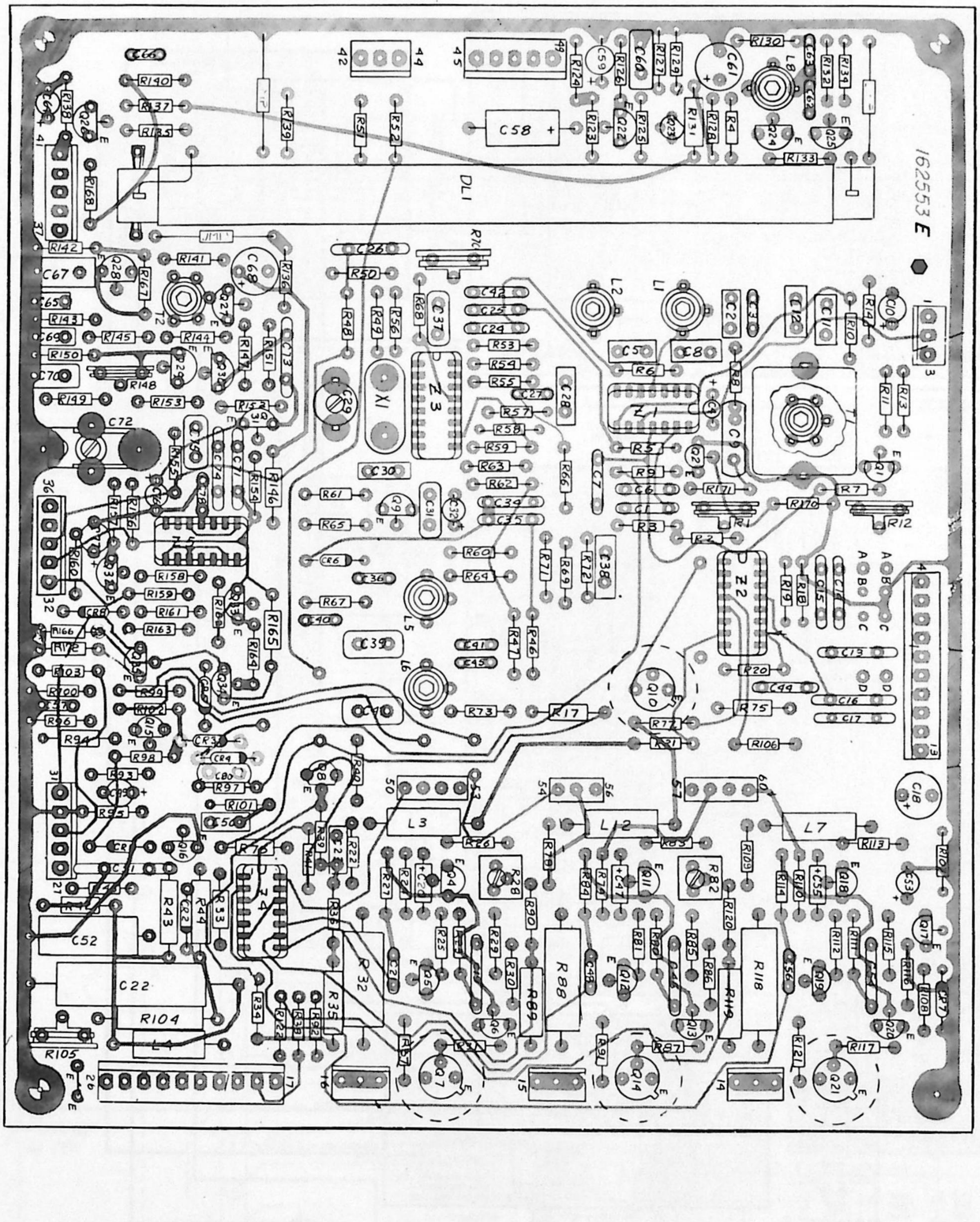
DRAWING DISTR	
1	T
3	M
7 B	A
8	TS
9	

CONRAC
CONRAC DIVISION

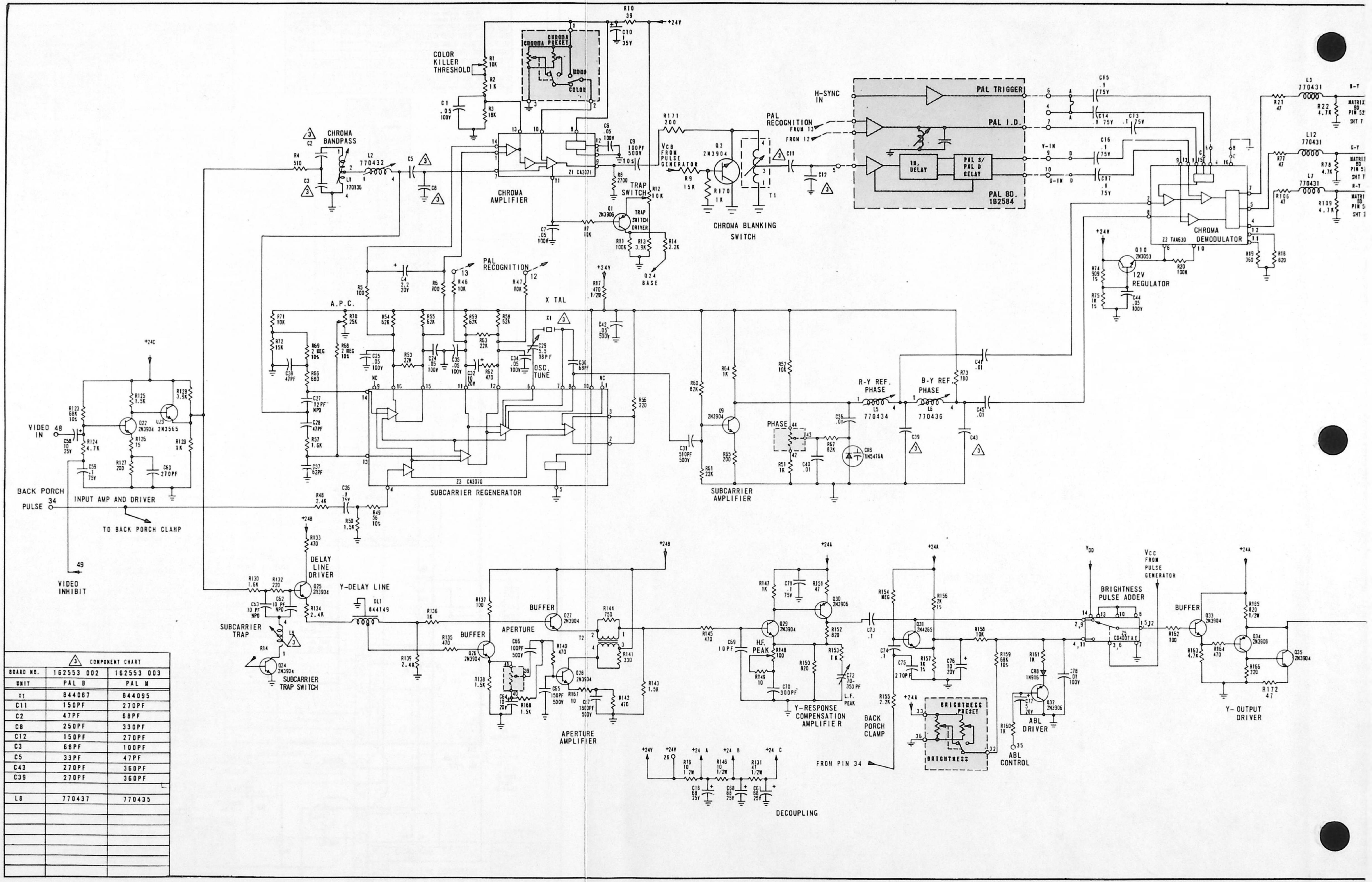
TITLE
SYSTEM DIAGRAM
PAL B , PAL M
5513,5514,5523,5524

NAME	DATE
DRAWN BY D.LANGE	11-15-74
CHECKED BY	
APPROVED	

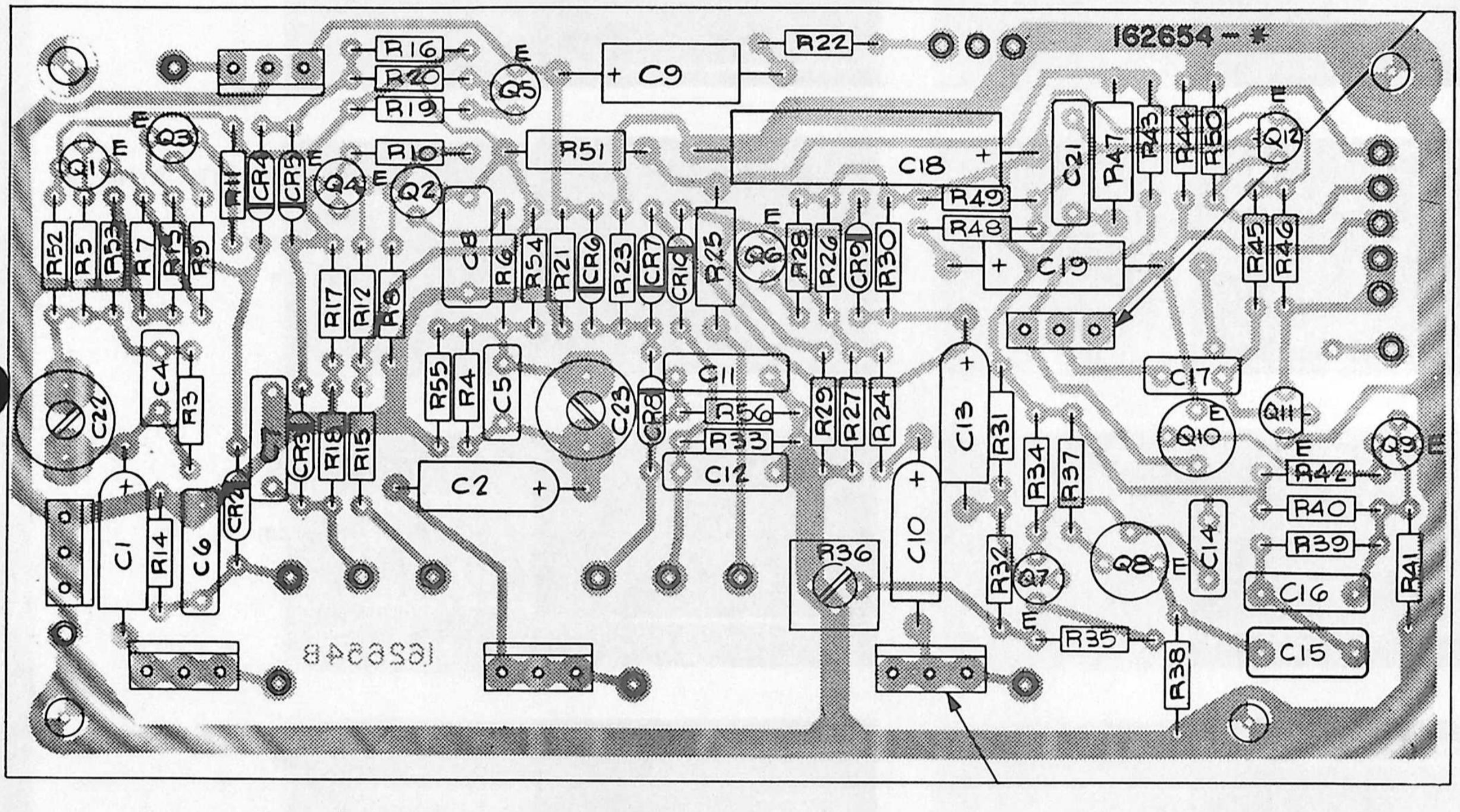
PART NUMBER
452607



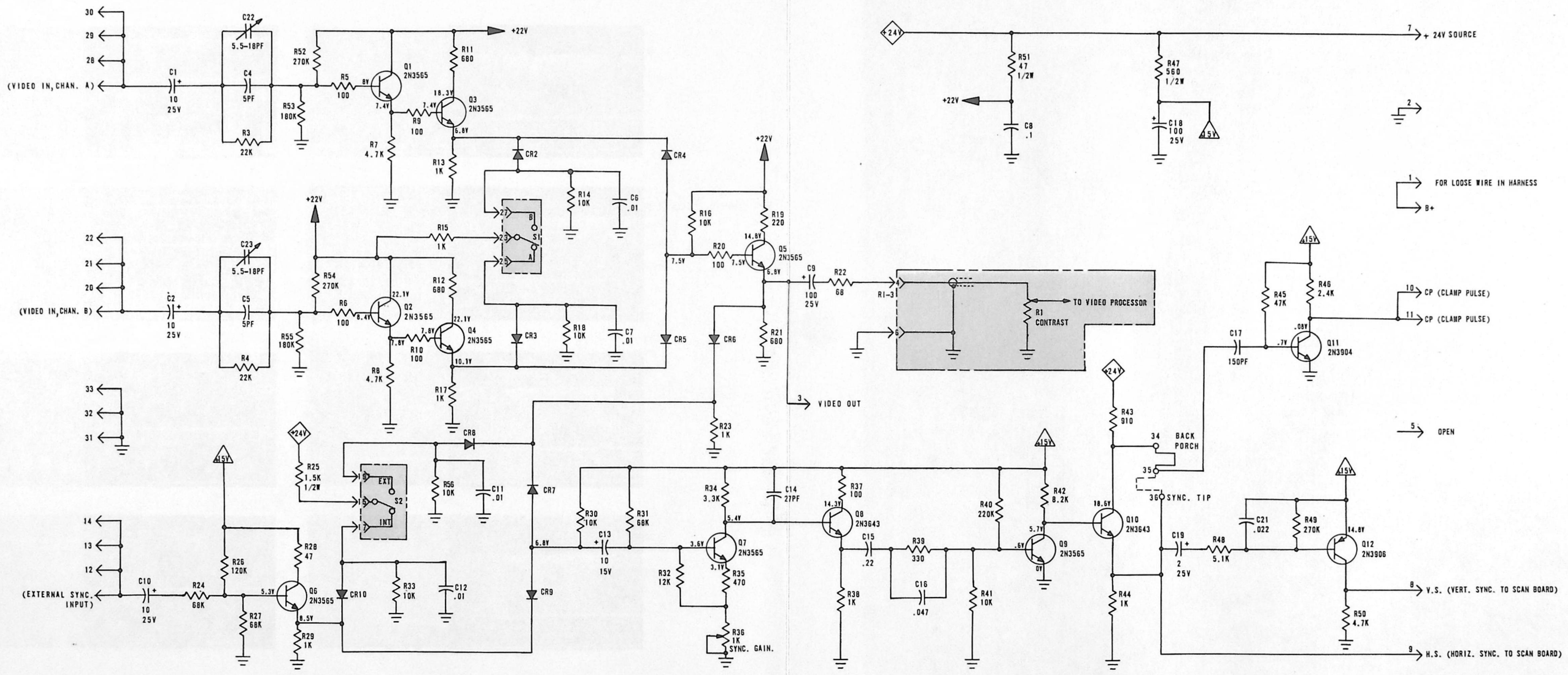
162553 E
DL1
Z1
Z2
Z3
Z4
Z5
X1
T1
T2
L1
L2
L3
L4
L5
L6
L7
L8
L12
C58
C52
C22
R104
R105
R88
R89
R118
R119
R32
R43
R44
R33
C67
C72
Q1
Q2
Q7
Q10
Q14
Q21
R1
R12
JMP1
42
44
45
49
41
37
36
32
31
27
26
17
16
15
14
13
50
53
54
56
57
60
4
1
3
A
B
C
D
E



△3 COMPONENT CHART		
BOARD NO.	162553 002	162553 003
UNIT	PAL B	PAL M
X1	844067	844095
C11	150PF	270PF
C2	47PF	68PF
C8	250PF	330PF
C12	150PF	270PF
C3	68PF	100PF
C5	33PF	47PF
C43	270PF	360PF
C39	270PF	360PF
L8	770437	770435


162654 - *
R16
R20
R19
R10
R51
R22
C9
C18
C21
R47
R43
R44
R50
Q12
Q5
Q3
Q1
Q4
Q2
Q6
E
R11
CR4
CR5
R49
R48
C19
R52
R5
R53
R7
R13
R9
C8
R6
R54
R21
CR6
R23
CR7
CR10
R25
R28
R26
CR9
R30
R45
R46
R17
R12
R8
C17
C4
R3
R55
R4
C5
C11
C22
C23
CR8
R56
R33
R29
R27
R24
C13
R31
Q11
Q10
Q9
CR3
R18
R15
C12
R34
R37
R42
C2
C1
R14
C6
CR2
R36
C10
R32
Q7
Q8
C14
R40
R39
R41
C16
R35
R38
C15
162654B

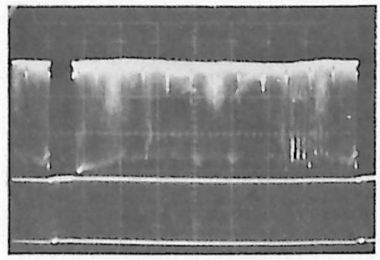
REV	ECO	DESCRIPTION	DFT	CHKD	APPD.	DATE
A		NEW DWG.				8-7-75
B	5912	REVISED DESIGNATORS.				8-21-75
C	6228	C4 AND C5 WERE 15PF				4/6/76
D	10135	R19 WAS 470 Ω	S.H			



5. SHADED AREA INDICATES ITEM LOCATED OFF BOARD.
4. ALL DIODES ARE 1N916.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL RESISTOR VALUES ARE IN OHMS, ± 5% 1/4W.
1. JUMPER PLUG FOR BACK PORCH OR SYNC. TIP CLAMP SELECT.
NOTES: (UNLESS OTHERWISE SPECIFIED)

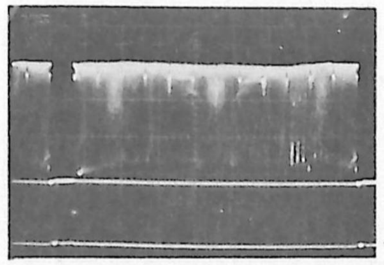
DUAL CHANNEL VIDEO INPUT MODULE
BOARD NO. 162654, REV. D, DATED 8-26-76

Symbol	Description	Conrac Part No.
DUAL CHANNEL VIDEO INPUT BOARD 162654-001	PARTS LIST	
	CAPACITORS	
C1, C2, C10, C13	10µF, Electrolytic, 25V	211460
C4, C5	5pF, Dipped Mica, 500V, ± 5%	210035
C6, C7, C11, C12	.01µF, Molded Polyester, 630V, ± 10%	211146-103
C8	.1µF, Molded Polyester, 100V, ± 10%	211149-104
C9	100µF, Electrolytic, 15V	211605-001
C14	27pF, Ceramic Disc, 500V, ± 5%	210130
C15	.22µF, Molded Polyester, 100V, ± 10%	211150-224
C16	.047µF, Molded Polyester, 250V, ± 10%	211148-473
C17	150pF, Dipped Mica, 500V, ± 5%	210375
C18	100µF, Electrolytic, 25V	211615
C19	2µF, Electrolytic, 25V	211365
C21	.022µF, Molded Polyester, 400V, ± 10%	211147-223
C22, C23	5.5-18pF, Trimmer	211845
	DIODES	
CR2-CR10	Switching (1N916)	206105
	RESISTORS	
	Except as listed below, all resistors on this board are replaceable by 1/4W, ± 5%, carbon film units. For exact value, see schematic diagram.	
R25	1500 ohms, Carbon Film, ½W, ± 5%	201332-152
R36	Potentiometer, 1000 ohms	928490-102
R47	560 ohms, Carbon Film, ½W, ± 5%	201332-561
R51	47 ohms, Carbon Film, ½W, ± 5%	201332-470
	TRANSITORS	
Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q9	NPN (2N3565)	207175
Q8, Q10	NPN (2N3643)	207205
Q11	NPN (2N3904)	207227
Q12	PNP (2N3906)	207228
	MISCELLANEOUS	
	Terminal Wafer, 3-Pin	886198-003
	Terminal Wafer, 3-Pin	886147-003
	Terminal	886145-002
	Connector Housing	886197-002



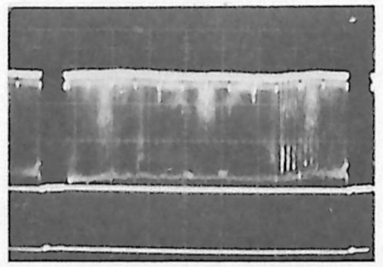
Q1 BASE

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



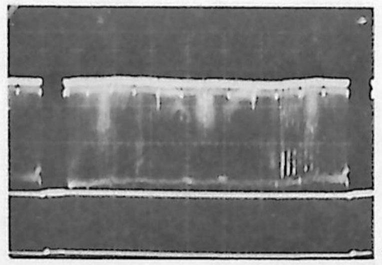
Q3 EMITTER

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



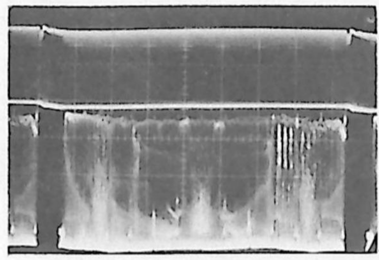
Q5 EMITTER

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



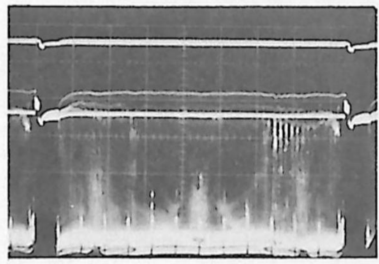
Q7 BASE

HORIZ = 2 msec/cm
VERT = 0.2 V./cm



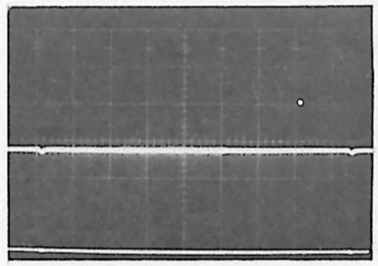
Q7 COLLECTOR

HORIZ = 2 msec/cm
VERT = 0.5 V./cm



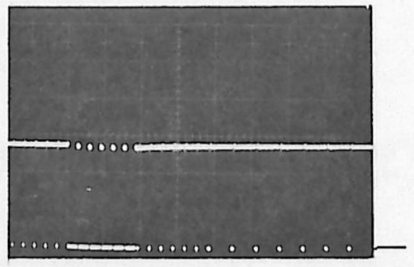
Q9 BASE

HORIZ = 2 msec/cm
VERT = 0.5 V./cm



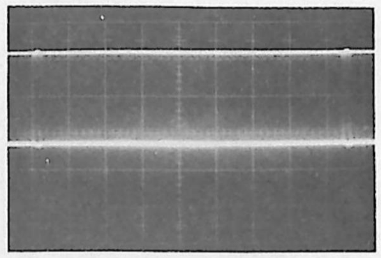
Q9 COLLECTOR

HORIZ = 2 msec/cm
VERT = 5 V./cm



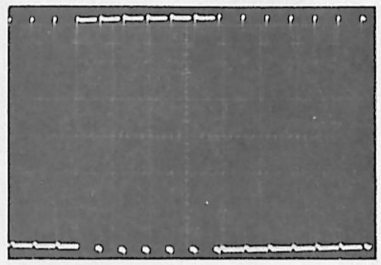
Q9 COLLECTOR

HORIZ = 100 μsec/cm
VERT = 5 V./cm



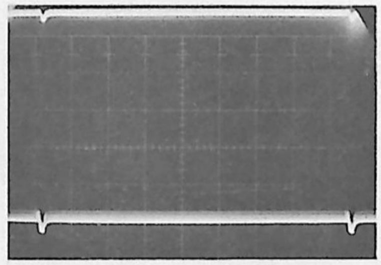
Q10 COLLECTOR

HORIZ = 2 msec/cm
VERT = 5 V./cm



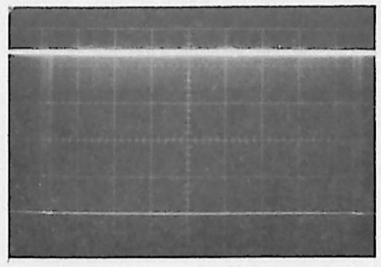
Q10 COLLECTOR

HORIZ = 50 μsec/cm
VERT = 2 V./cm



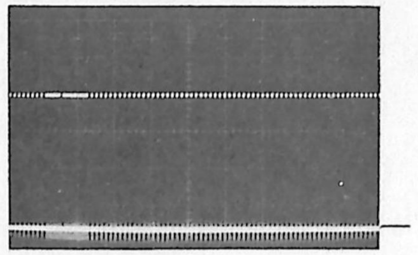
Q10 EMITTER

HORIZ = 2 msec/cm
VERT = 2 V./cm



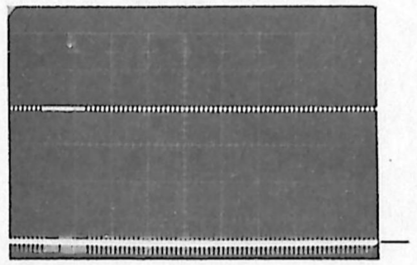
HORIZ = 2 msec/cm
VERT = 2 V./cm

Q11 BASE



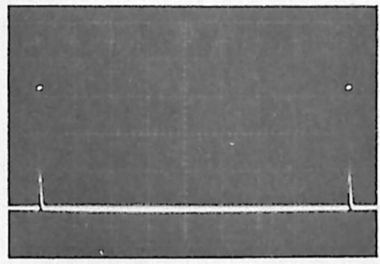
Q11 COLLECTOR

HORIZ = 500 μsec/cm
VERT = 0.2 V./cm



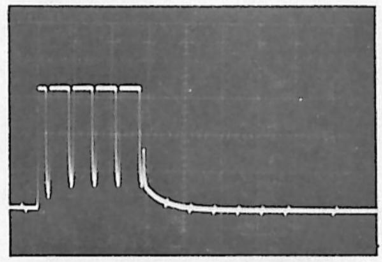
Q11 COLLECTOR WITH SYNC TIP

HORIZ = 500 μsec/cm
VERT = 0.2 V./cm



Q11 COLLECTOR

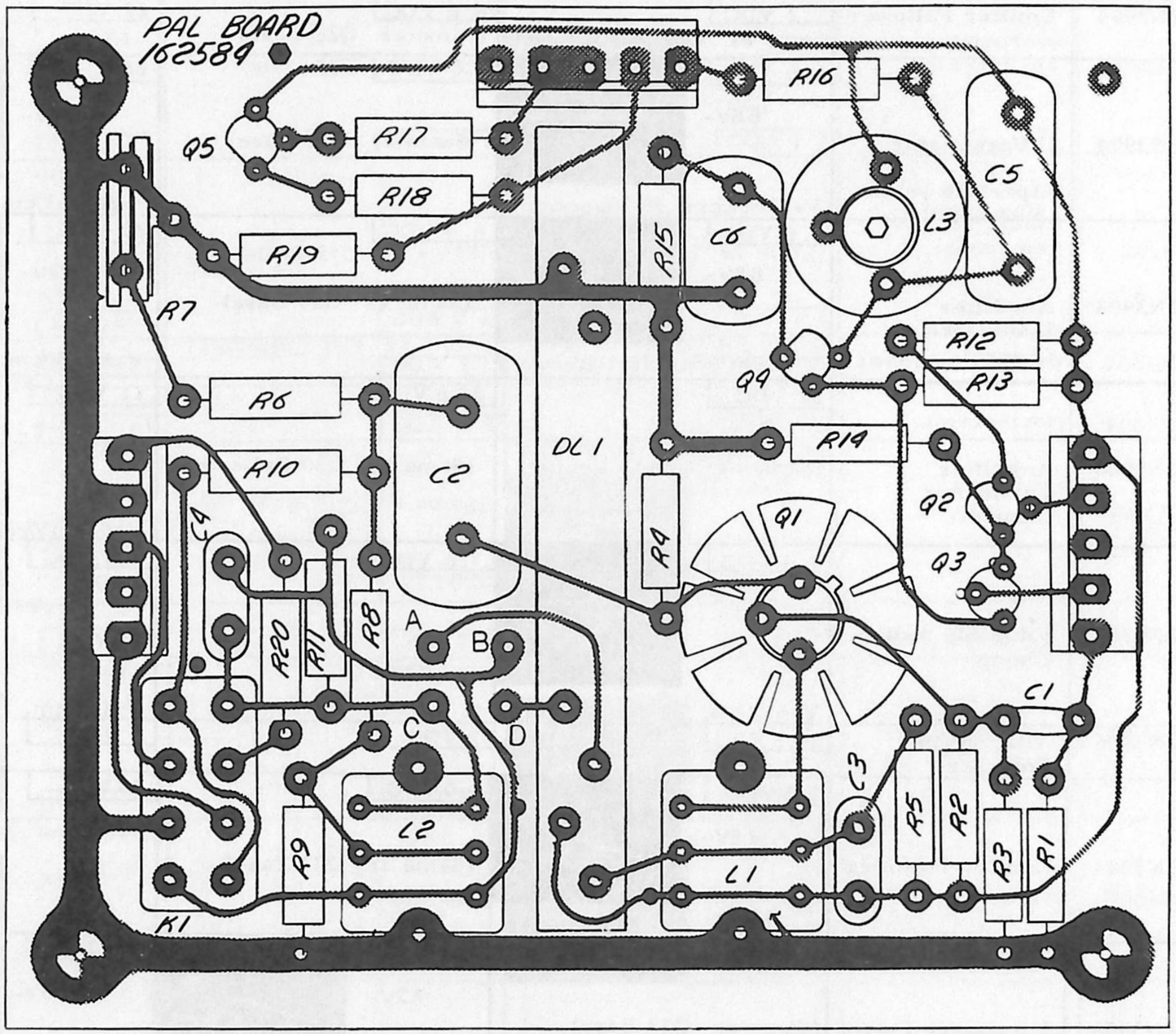
HORIZ = 2 msec/cm
VERT = 5 V./cm



Q11 COLLECTOR

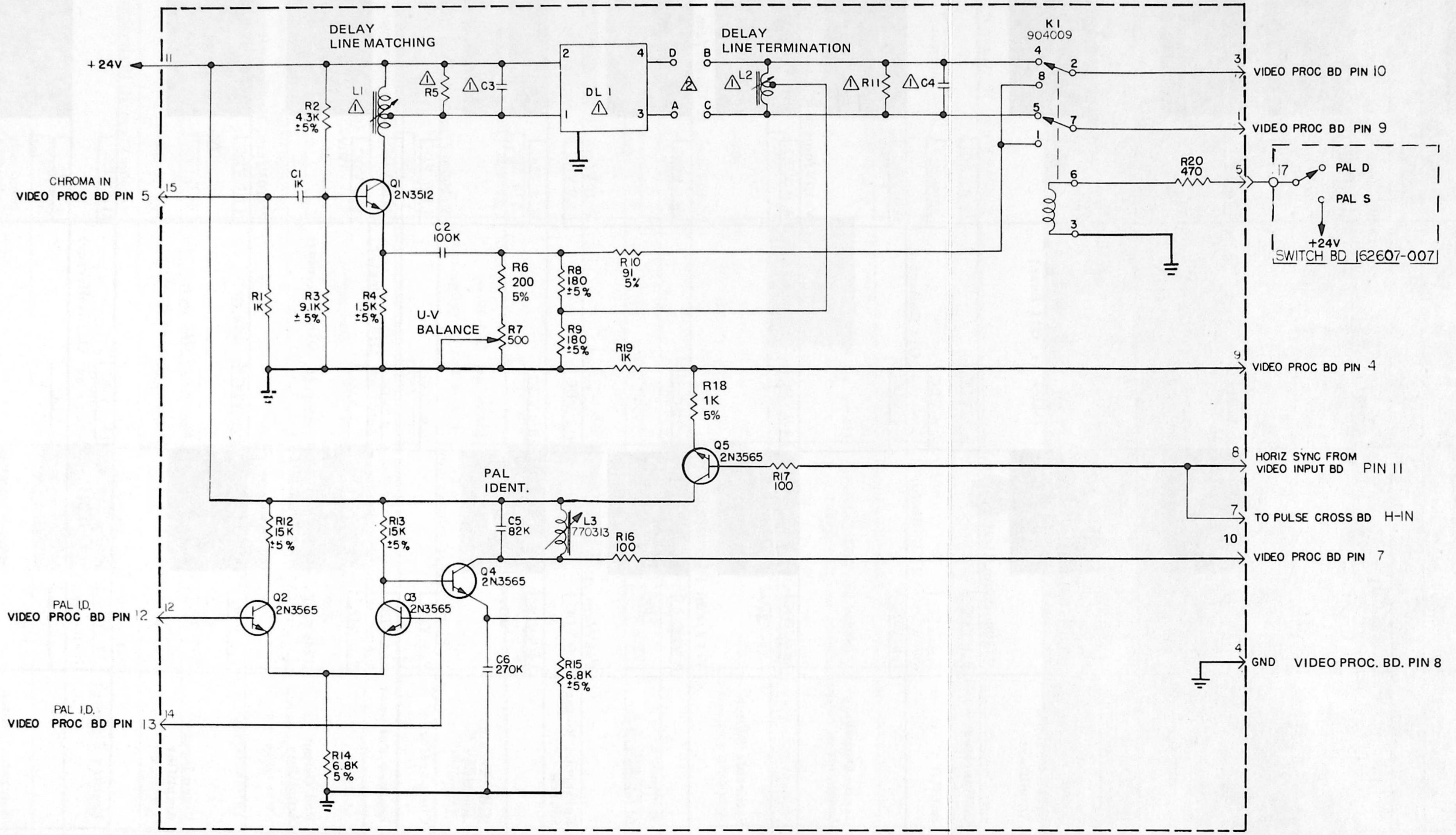
HORIZ = 50 μsec/cm
VERT = 5 V./cm

NOTE: PHOTOS TAKEN USING BACK PORCH (RATHER THAN SYNC TIP) CLAMP.


PAL BOARD
162584
Q5
R17
R18
R19
R16
C5
C6
L3
R15
R7
R6
R10
C2
DL 1
R12
R13
Q9
R14
Q2
Q3
Q1
R4
C4
R20
R11
R8
A
B
C
D
C1
C3
R5
R2
R3
R1
L2
L1
R9
K1

162584

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DWG	[illegible]	[illegible]	12-3-78
B	4455	R5 & R11 (-002 CONFIG) WERE 1/2W	RS	[illegible]	12-13-7[illegible]
C	4578	R5 & R11 (-002) WERE 1/8 W	[illegible]		[illegible]
D	5329	R6 WAS 120. -001 R11 WAS 383, 1% -002 R5 & R11 WAS 562, 1%	[illegible]	[illegible]	[illegible]
E	5392	REVISED PIN NOS	[illegible]	[illegible]	[illegible]
F	[illegible]	R8 WAS [illegible].8K	[illegible]	[illegible]	[illegible]



COMPONENT CHART ⚠								
BOARD NO.	UNIT	DL 1	L1	L2	C3	C4	R5	R11
162584-002	PAL M	63.48 ±.005 μs	770355	770356	150,5%	47,5%	287, 1%	301, 1%
162584-001	PAL B	63.943 ±.005	770353	770353	180,5%	27,5%	383, 1%	475, 1%

4. ALL CAPACITORS VALUES ARE IN PICOFARADS ±10%.

3. ALL RESISTORS VALUES ARE IN OHMS ±10%, 1/2 W.

⚠2 DL1 —— JUMPER NOTE – PAL B 162584-001 (D TO C & A TO B) PAL M 162584-002. (D TO B & A TO C).

⚠ FOR VALUES REFER TO COMPONENT CHART.

NOTE: UNLESS OTHERWISE SPECIFIED.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR.		USED ON	NEXT DRW.
		5100,5500	
1	9		
3	T		
4A	M		
7B			
8			

TOLERANCE UNLESS OTHERWISE SPECIFIED:
.XX ± .03
.XXX ± .010
ANGULAR: ± 1°

MATERIAL:

FINISH

CONRAC

CONRAC DIVISION
[illegible]
[illegible]
[illegible]

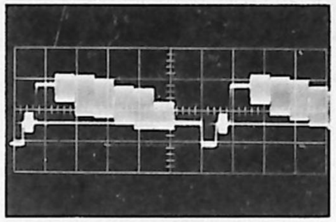
TITLE:
SCHEMATIC,
PAL BOARD

	NAME	DATE
DRAWN BY:	[illegible]	[illegible]
CHECKED BY:	[illegible]	[illegible]
APPROVED	[illegible]	2-3-79

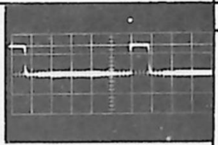
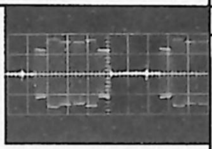
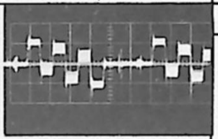
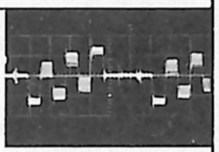
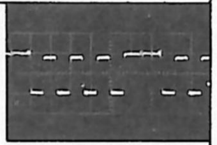
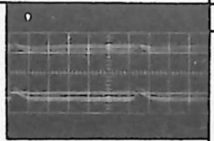
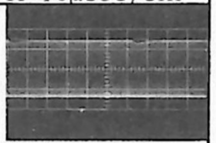
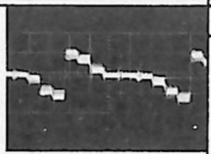
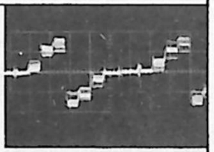
PART NUMBER
162584

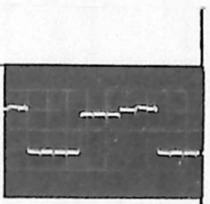
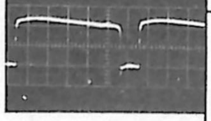
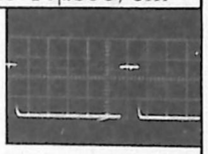
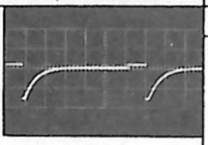
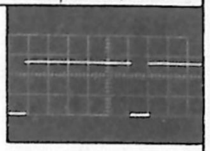
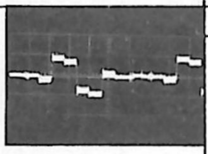
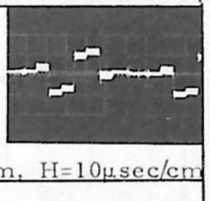
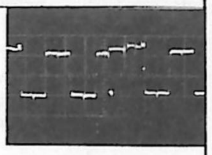
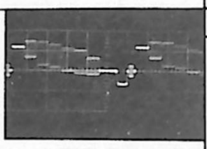
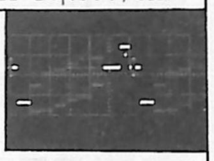
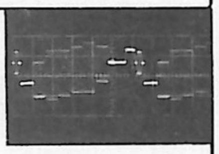
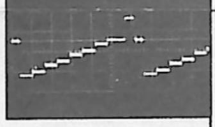
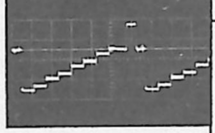
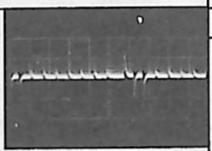
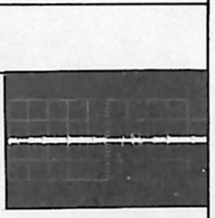
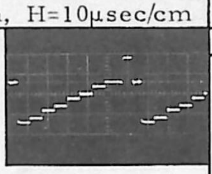
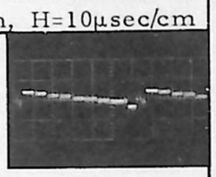
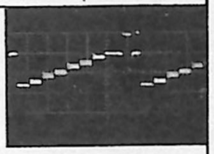
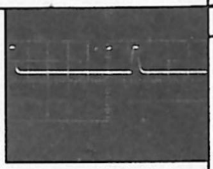
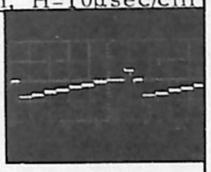
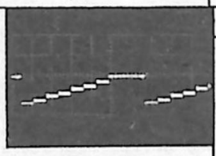
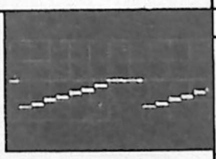
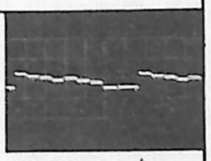
VIDEO PROCESSOR BOARD NO. 162553

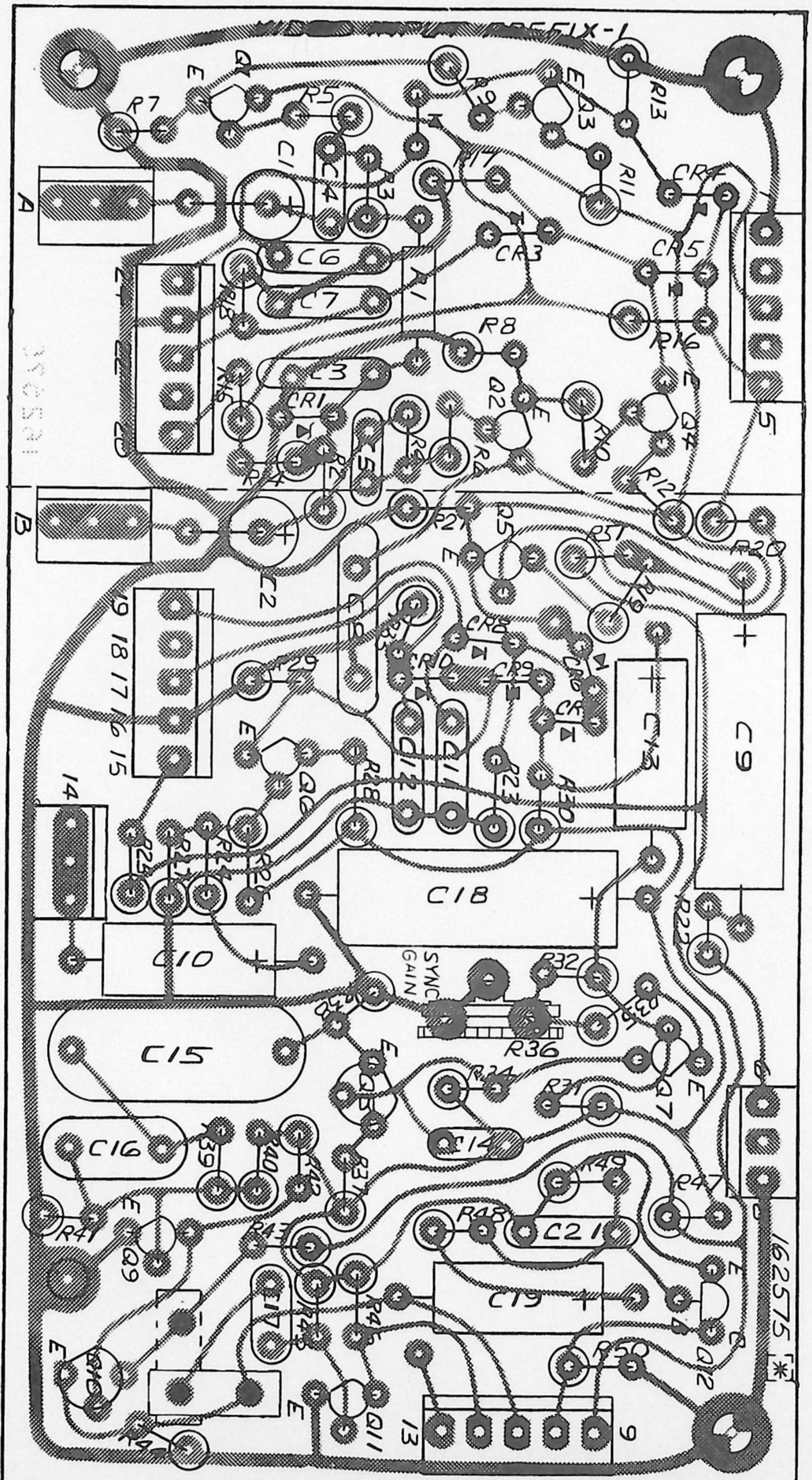
TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 voltmeter. All monitor controls adjusted for normal operation.



Standard Color Bar Test Input Signal:

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3906	Saturable Switch 3.58MHz Trap	Color 15V, Mono 20V	16.5 VDC Varies with R12	Color 6V, Mono 2V
Q2	2N3904	Chroma Blanking	0.1 VDC  V=500mV/cm, H=10µsec/cm	0 VDC  V=200mV/cm, H=10µsec/cm	ground Ground
Q4	2N3906	Blue Chroma Amplifier	19.5 VDC  V=200mV/cm, H=10µsec/cm	20.0 VDC (Same as Q4 Base)	8.2 VDC  V=500mV/cm, H=10µsec/cm
Q5	2N3904	Comparator	9.0 VDC	8.6 VDC	19.5 VDC
Q6	2N3904	Emitter Follower	8.2 VDC (Same as Q4 Collector)	7.6 VDC (Same as Q4 Collector)	22 VDC
Q7	39393	Output Amplifier Blue	7.6 VDC (Same as Q4 Collector)	7.0 VDC (Same as Q4 Collector)	150 VDC  V=10V/cm, H=10µsec/cm
Q9	2N3904	Subcarrier Amplifier	1.5VDC  V=.5V/cm, H=10µsec/cm	1.1VDC (Same as Q9 Base)	11.0 VDC  V=1V/cm, H=10µsec/cm
Q10	2N3053	12V Regulator Pass Transistor	12.5 VDC	12.0 VDC	24.0 VDC
Q11	2N3904	Green Chroma Amplifier	19.5 VDC  V=100mV/cm, H=10µsec/cm	20.0 VDC (Same as Q11 Base)	8.2 VDC  V=200mV/cm, H=10µsec/cm
Q12	2N3904	Comparator	9.1 VDC	8.6 VDC	19.0 VDC

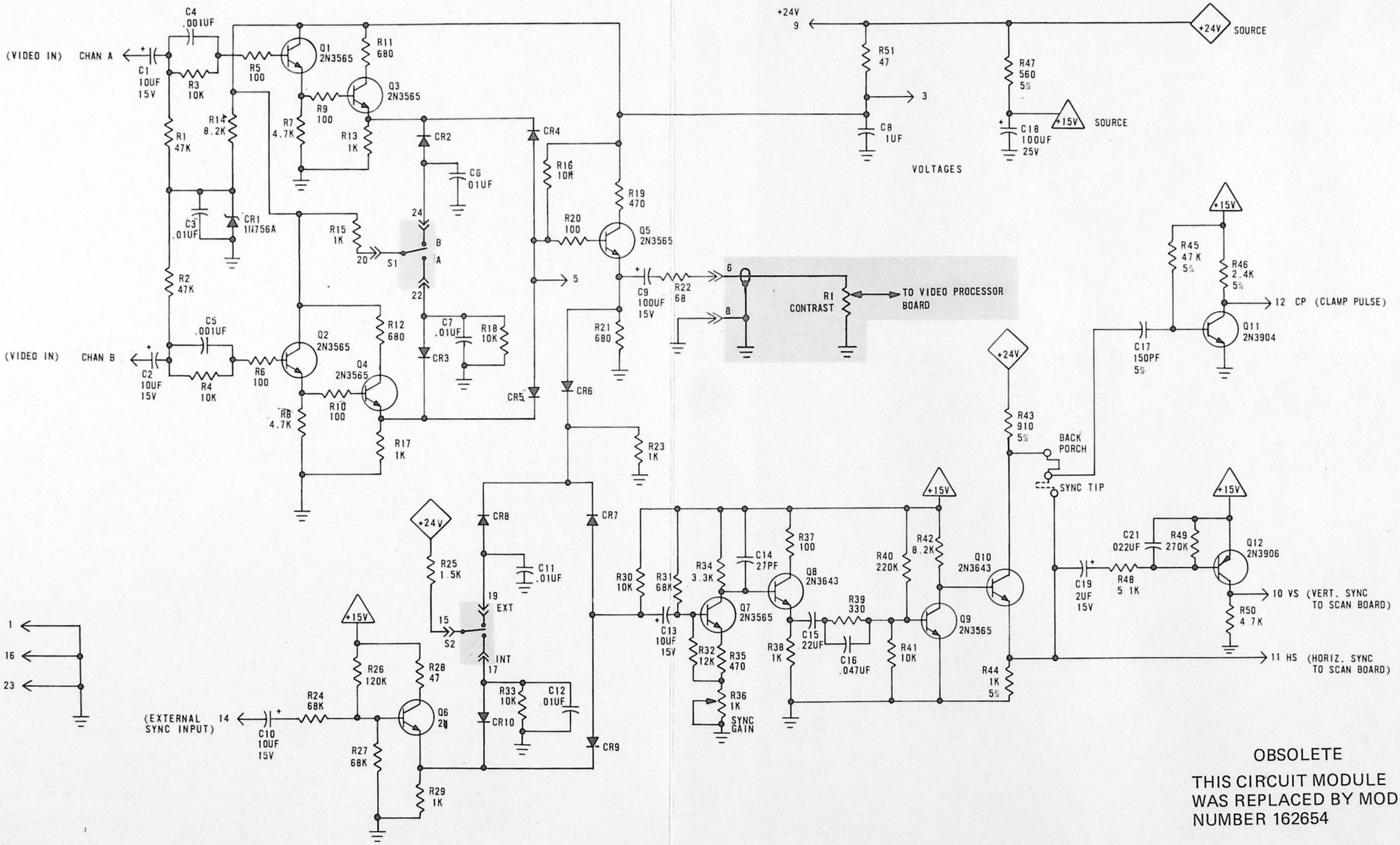
Q13	2N3904	Emitter Follower	8.2 VDC (Same as Q11 Collector)	7.8 VDC Same as Q11 Collector	22 VDC
Q14	39393	Green Output Amplifier	7.8 VDC (Same as Q11 Collector)	7.2 VDC (Same as Q11 Collector)	150 VDC 150V–  V=10V/cm, H=10µsec/cm
Q15	2N3906	Saturable Switch	25.0 VDC 24V–  V=1V/cm, H=10µsec/cm	24.0 VDC	4.0 VDC  0V– V=10V/cm, H=10µsec/cm
Q16	2N3904	Blanking Output	0 VDC 0V–  V=5V/cm, H=10µsec/cm	0 VDC Ground	20.5 VDC  0V– V=10V/cm, H=10µsec/cm
Q17	2N3904	Reference Voltage Source	8.6 VDC	9.2 VDC	23.0 VDC
Q18	2N3906	Red Chroma Amplifier	19.5 VDC 19.5V–  V=100mV/cm, H=10µsec/cm	20.0 VDC (Same as Q18 Base)	8.4 VDC 8.4V–  V=200mV/cm, H=10µsec/cm
Q19	2N3904	Comparator	9.1 VDC	8.6 VDC	19.0 VDC
Q20	2N3904	Emitter Follower	8.4 VDC (Same as Q18 Collector)	7.8 VDC (Same as Q18 Collector)	22.0 VDC
Q21	39393	Red Output Amplifier	7.8 VDC (Same as Q18 Collector)	7.2 VDC (Same as Q18 Collector)	150 VDC 150V–  V=10V/cm, H=10µsec/cm
Q22	2N3904	Video Input Amplifier	1.2 VDC 1.2V–  V=100mV/cm, H=10µsec/cm	0.6 VDC (Same as Q22 Base)	17.0 VDC 17V–  V=500mV/cm, H=10µsec/cm
Q23	2N3565	Emitter Follower	17 VDC (Same as Q22 Collector)	16.2 VDC (Same as Q22 Collector)	21.5 VDC
Q24	2N3904	Saturable Switch	Color 0.7V, Mono 0V	0 VDC Ground	0 VDC 0V– Mono only Color 0VDC  V=500mV/cm, H=10µsec/cm
Q25	2N3904	Emitter Follower	16 VDC 16V–  V=500mV/cm, H=10µsec/cm	15.4 VDC (Same as Q25 Base)	21 VDC
Q26	2N3904	Emitter Follower	7.2 VDC 7.2V–  V=200mV/cm, H=10µsec/cm	6.6 VDC (Same as Q26 Base)	22 VDC
Q27	2N3904	Emitter Follower	7.2 VDC (Same as Q26 Base)	6.6 VDC (Same as Q26 Base)	22 VDC
Q28	2N3904	Differentiator (Aperture set at Maximum)	6.6 VDC 6.6V–  V=50mV/cm, H=10µsec/cm	6.0 VDC (Same as Q28 Base)	22 VDC 22V–  V=200mV/cm, H=10µsec/cm
Q29	2N3904	Amplifier Luminance Channel	6.6 VDC 6.6V–  V=200mV/cm, H=10µsec/cm	6.0 VDC (Same as Q29 Base)	22 VDC 22V–  V=50mV/cm, H=10µsec/cm
Q30	2N3906	Amplifier Luminance Channel	22 VDC (Same as Q29 Collector)	22.6 VDC (Same as Q30 Collector)	11 VDC 11V–  V=500mV/cm, H=10µsec/cm
Q31	2N4265	Saturable Switch Clamp	2.0 VDC 0V–  V=5V/cm, H=10µsec/cm	7.6 VDC	7.5 VDC 7.5V–  V=1V/cm, H=10µsec/cm
Q32	2N3906	ABL Emitter Follower	13.5 VDC	7 VDC	0 VDC Ground
Q33	2N3904	Emitter Follower	7.5 VDC 7.5V–  V=1V/cm, H=10µsec/cm	7.0 VDC (Same as Q33 Base)	23 VDC
Q34	2N3906	Luminance Output Driver Emitter Follower	7.0 VDC (Same as Q33 Base)	7.2 VDC 7.2V–  V=1V/cm, H=10µsec/cm	0.7 VDC .7V–  V=50mV/cm, H=10µsec/cm
Q35	2N3904	Luminance Output Driver Current Amplfier	0.7 VDC (Same as Q34 Collector)	0VDC Ground	7.2 VDC (Same as Q34 Emitter)


VIDEO INPUT ASSY X-1
A
B
E
Q1
R7
R5
C1
C4
R3
R9
E
Q3
R13
R11
R17
CR4
CR3
CR5
C6
C7
R1
R18
R8
R16
C3
R15
CR1
Q2
E
R10
Q4
E
R14
R2
R6
R4
R12
R27
R25
R21
R20
C2
R19
CR8
CR10
CR9
CR6
CR7
R29
R33
C8
C12
C11
R23
R30
C13
C9
E
Q6
R28
R22
R24
R26
R25
14
19 18 17 16 15
C18
C10
SYNC GAIN
R32
R36
R38
R33
C15
E
Q5
R34
R31
Q7
E
C14
C16
R39
R40
R42
R37
R49
R47
R41
E
Q9
R43
R48
C21
E
C17
R44
R46
C19
Q10
R45
E
Q11
R50
Q12
C
13
9
1
5
6
162575 [*]

162575

162575

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
C.	4967	REDRAWN (NO CHANGES)			



OBSOLETE

THIS CIRCUIT MODULE
WAS REPLACED BY MODULE
NUMBER 162654

5. SHADED AREA INDICATED ITEM LOCATED OFF BOARD
4. ALL DIODES ARE PG912
3. ALL CAPACITOR VALUES ARE IN MICROFARADS
2. ALL RESISTOR VALUES ARE IN OHMS, ±10% ½W
1. JUMPER PLUG FOR BACK PORCH OR SYNC TIP CLAMP SELECTION
NOTES: UNLESS OTHERWISE SPECIFIED

					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

DRAWING DISTR	USED ON	NEXT DRW
	5100/5500	
1	TS	
3	M	
7B	A	
8A		
9		

TOLERANCE
UNLESS OTHERWISE
SPECIFIED -
XX ± .03
XXX ± .010
ANGULAR: ± 1°

MATERIAL

FINISH

CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

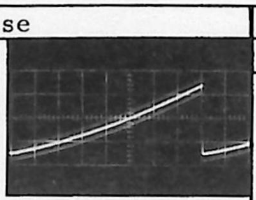
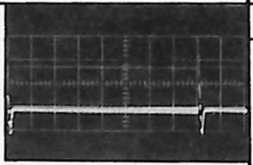
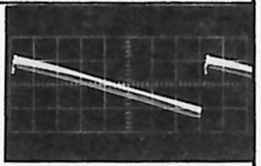
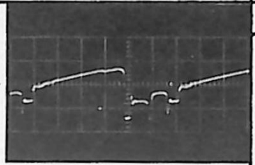
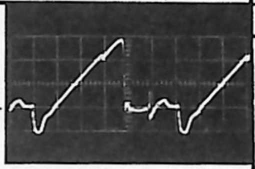
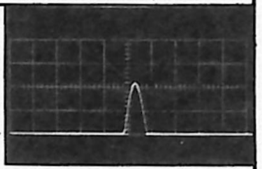
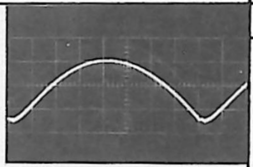
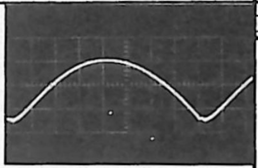
TITLE
SCHEMATIC, DUAL CHANNEL
VIDEO INPUT BOARD

	NAME	DATE
DRAWN BY	E.J. SPRAGUE	7-16-74
CHECKED BY	[illegible]	[illegible]
APPROVED	[illegible]	[illegible]

PART NUMBER
162575

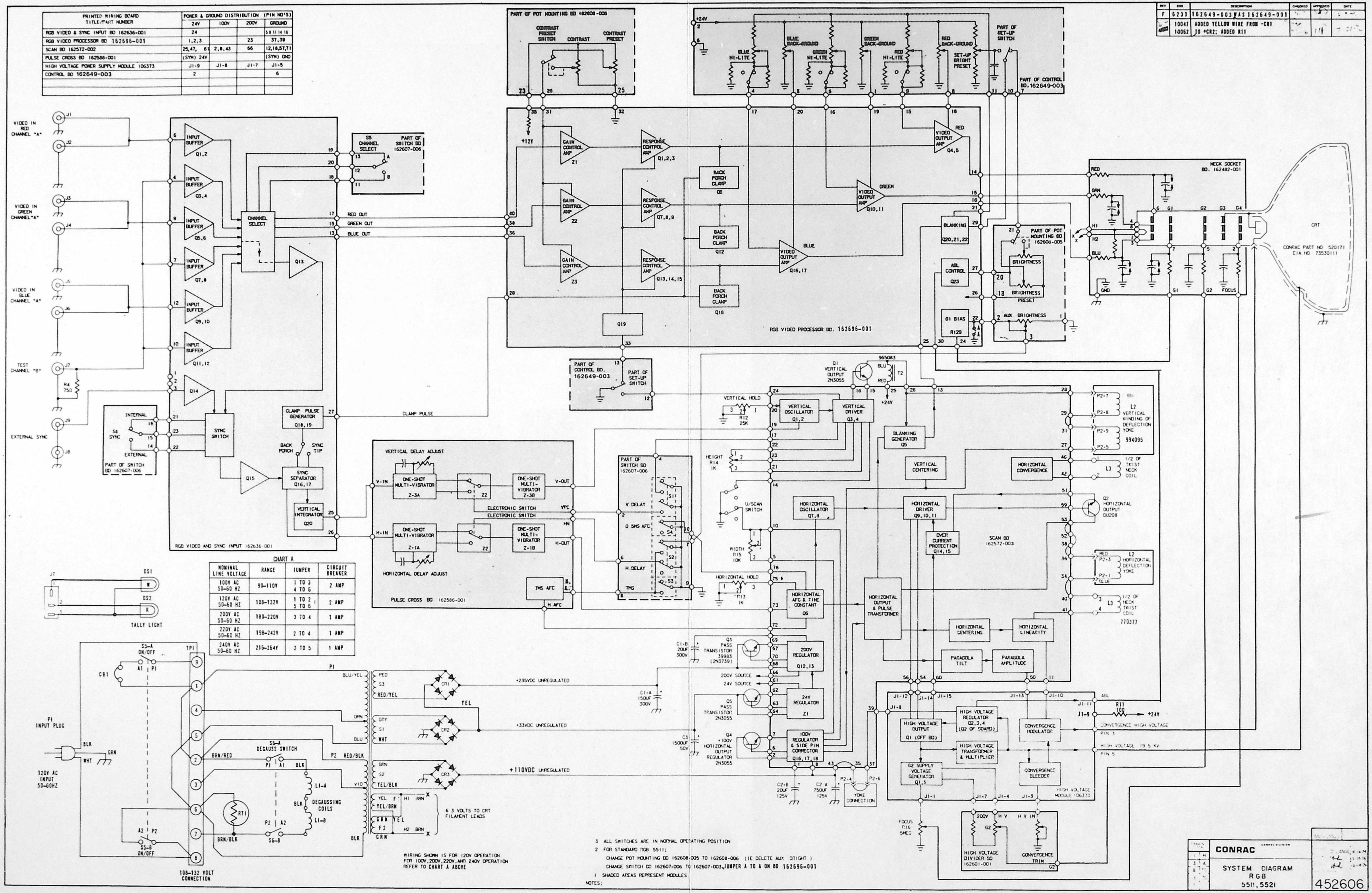
CHASSIS

TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-type 260 Voltmeter. All monitor controls adjusted for normal operation.

Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3055	Vertical Output Amplifier	3.5 VDC 0V–  V=2V/cm, H=2msec/cm	3.0 VDC 0V–  V=1V/cm, H=2msec/cm	21.0 VDC 0V–  V=10V/cm, H=2msec/cm
Q2	BU108	Horizontal Output Switch	-0.2 VDC 0V–  V=5 V/cm, H=10µsec/cm	0.6 VDC 0V–  V=1V/cm, H=10µsec/cm	CAUTION: Do Not Meas. DC 0V–  V=500V/cm, H=10µsec/cm
Q3	39983	+200V Regulator Pass Element	205 VDC	205 VDC	232 VDC
Q4	2N3055	Horizontal B+ Regulator Pass Element	83.0 VDC 83V–  V=1V/cm, H=2msec/cm	82.0 VDC 82V–  V=1V/cm, H=2msec/cm	105 VDC
Q5	2N3055	+24V Regulator Pass Element	24.6 VDC	24.0 VDC	34.0 VDC

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
F	6231	162649-003 WAS 162649-001			
	10047 10062	ADDED YELLOW WIRE FROM -CR1 TO +CR2; ADDED R11			7-21-76

PRINTED WIRING BOARD TITLE/PART NUMBER	POWER & GROUND DISTRIBUTION (PIN NO'S)			
	24V	100V	200V	GROUND
RGB VIDEO & SYNC INPUT BD 162636-001	24			5 8 11 14 16
RGB VIDEO PROCESSOR BD 162696-001	1,2,3		23	37,39
SCAN BD 162572-002	25,47, 61	2,8,43	66	12,18,57,71
PULSE CROSS BD 162586-001	(SYN) 24V			(SYN) GND
HIGH VOLTAGE POWER SUPPLY MODULE 106373	J1-9	J1-8	J1-7	J1-5
CONTROL BD 162649-003	2			6



WIRING SHOWN IS FOR 120V OPERATION
FOR 100V, 200V, 220V, AND 240V OPERATION
REFER TO CHART A ABOVE

CHART A

NOMINAL LINE VOLTAGE	RANGE	JUMPER	CIRCUIT BREAKER
100V AC 50-60 HZ	90-110V	1 TO 3 4 TO 6	2 AMP
120V AC 50-60 HZ	108-132V	1 TO 2 5 TO 6	2 AMP
200V AC 50-60 HZ	180-220V	3 TO 4	1 AMP
220V AC 50-60 HZ	198-242V	2 TO 4	1 AMP
240V AC 50-60 HZ	216-264V	2 TO 5	1 AMP

3 ALL SWITCHES ARE IN NORMAL OPERATING POSITION

2 FOR STANDARD RGB 5511;

CHANGE POT MOUNTING BD 162608-005 TO 162608-006 (IE DELETE AUX BRIGHT)

CHANGE SWITCH BD 162607-006 TO 162607-003, JUMPER A TO A ON BD 162696-001

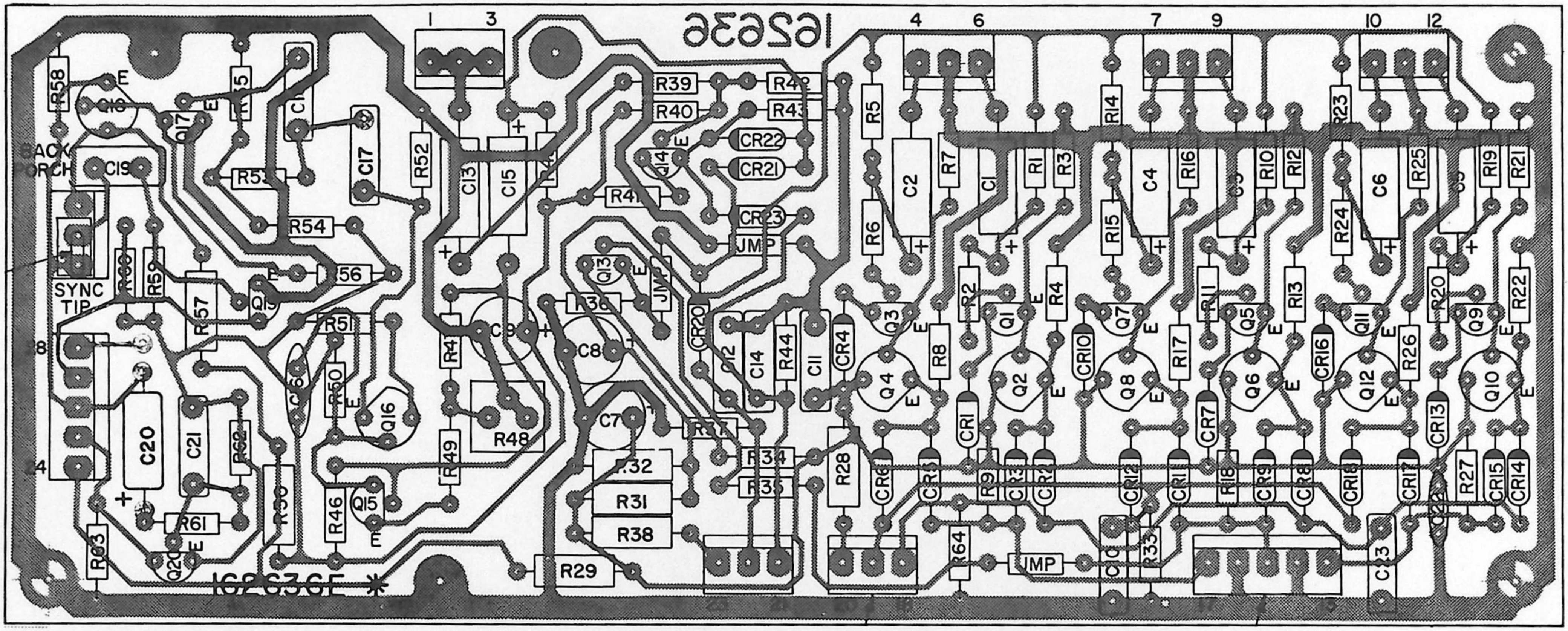
1 SHADED AREAS REPRESENT MODULES

NOTES;

CONRAC

SYSTEM DIAGRAM
RGB
5511, 5521

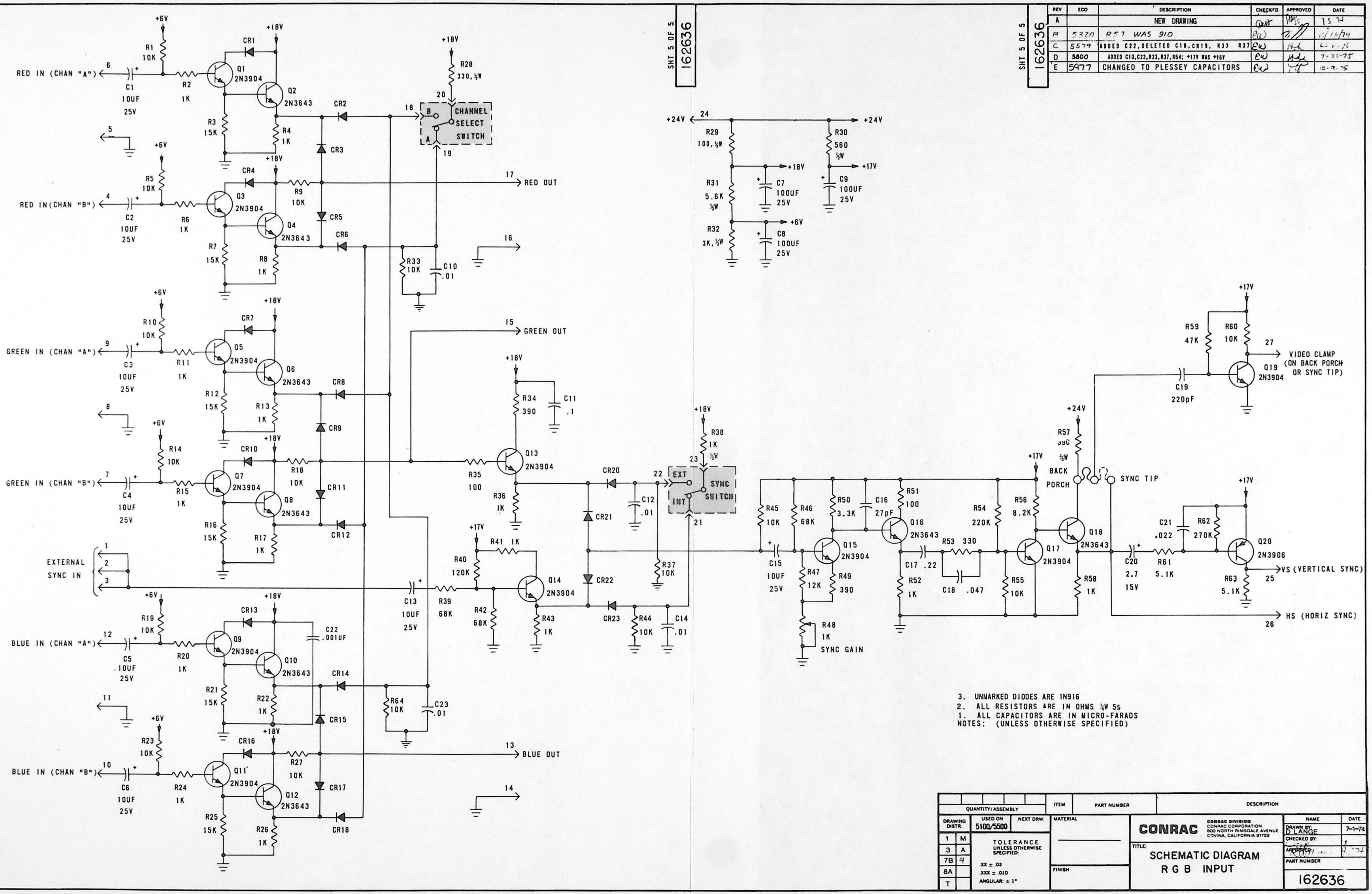
452606


162636
1
3
4
6
7
9
10
12
BACK PORCH
SYNC TIP
28
24
R58
Q18
E
Q17
R55
C16
C17
C19
R53
R54
R56
Q19
R60
R59
R57
R51
C18
R50
Q16
E
C20
C21
R62
R61
Q20
R63
R30
R46
Q15
162636F *
R52
C13
C15
R47
C9
C8
R48
R49
C7
R32
R31
R38
R29
R39
R40
R42
R43
Q14
CR22
CR21
R41
CR23
JMP
Q13
R36
R37
R34
R35
CR20
C12
C14
R44
C11
CR4
R5
R6
C2
R7
C1
R1
R3
Q3
Q4
R8
Q1
Q2
R2
R4
CR1
CR6
CR5
R9
CR3
CR2
R28
R64
JMP
C10
R33
R14
R15
C4
R16
C3
R10
R12
Q7
Q8
CR10
R11
Q5
Q6
R13
R17
CR7
CR12
CR11
R18
CR9
CR8
R23
R24
C6
R25
C5
R19
R21
Q11
Q12
CR16
R26
R20
Q9
Q10
R22
CR13
CR18
CR17
C22
R27
CR15
CR14
C23
23
21
20
18
17
15
+

SHT 5 OF 5
162636

SHT 5 OF 5
162636

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DRAWING	Qut		1 5 74
B	5320	R57 WAS 910	EW		12/16/74
C	5579	ADDED C22, DELETED C18, CR19, R33 R37	EW		6-4-75
D	5800	ADDED C10, C23, R33, R37, R64; +17V WAS +16V	EW		7-23-75
E	5977	CHANGED TO PLESSEY CAPACITORS	EW		10-9-75



3. UNMARKED DIODES ARE 1N916
2. ALL RESISTORS ARE IN OHMS ¼W 5%
1. ALL CAPACITORS ARE IN MICRO-FARADS
NOTES: (UNLESS OTHERWISE SPECIFIED)

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

DRAWING DISTR.
1	M
3	A
7B	9
8A	
T	

USED ON: 5100/5500
NEXT DRW.

TOLERANCE
UNLESS OTHERWISE
SPECIFIED:
.XX ± .03
.XXX ± .010
ANGULAR: ± 1°

MATERIAL
FINISH

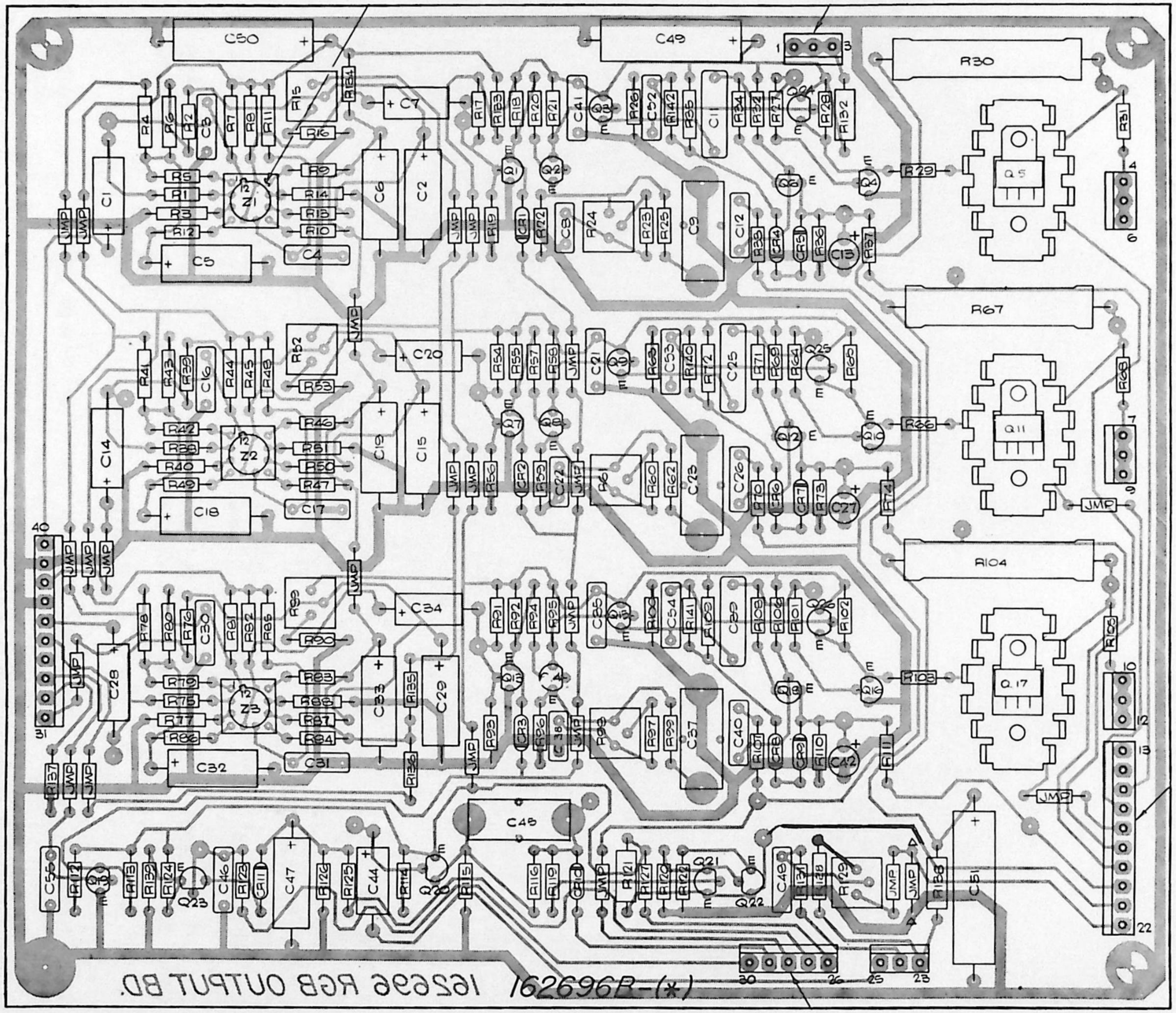
CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:
SCHEMATIC DIAGRAM
R G B INPUT

	NAME	DATE
DRAWN BY:	D LANGE	7-1-74
CHECKED BY:		
APPROVED:		

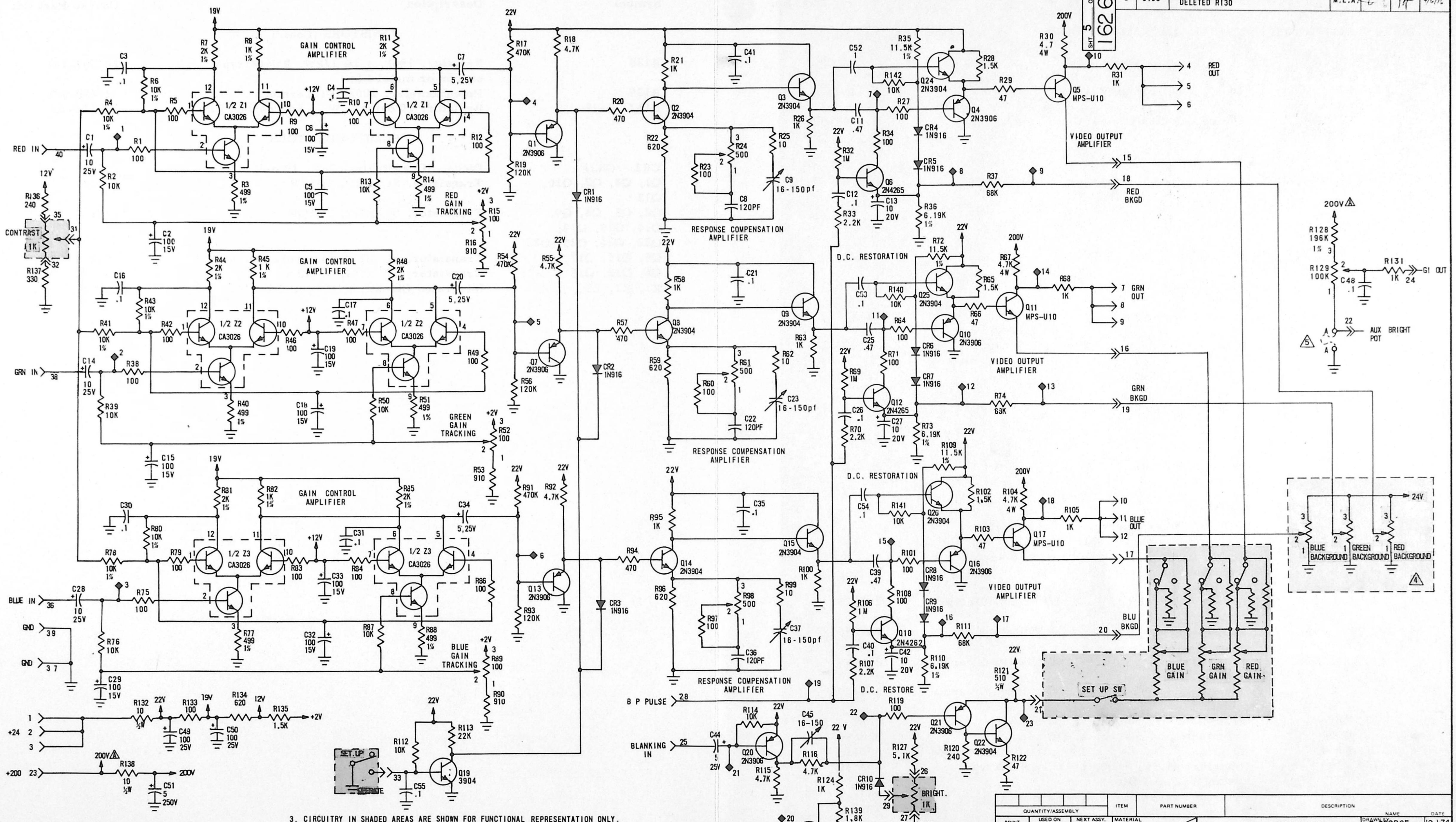
PART NUMBER
162636

Symbol	Description	Conrac Part number
	VIDEO AND SYNC INPUT BOARD NO. 162636, PARTS LIST	
	CAPACITORS	
C1 – C6,13,15	10μF, 25V, -10 +75% Electrolytic, Axial	211460
C7,8,9	100μF, 25V Electrolytic, Axial	211616-002
C10,12,14,23	.01μF, 630V, 10%, Minibox Polyester	211146-103
C11	.1μF, 100V, 10% Minibox Polyester	211149-104
C16	27pF, 500V, 5% Ceramic Disc NPO	210130
C17	.22μF, 100V, 10%, Minibox Polyester	211150-224
C18	.047μF, 250V, 10% Minibox Polyester	211148-473
C19	220pF, 500V, 5% Dipped Mica	210425
C20	2.7μF, 35V, 10% Tubular Tantalum	211395
C21	.022μF, 400V, 10% Minibox Polyester	211147-223
C22	.001μF, 1000V, 20% Ceramic Disc Z5U	210676
	RESISTORS	
	NOTE: Except as listed below, all resistors are replaceable by ¼W, 5%, carbon film. Refer to schematic for exact values.	
R28	330 ohms, ½W	201332-331
R29	100 ohms, ½W	201332-101
R30	560 ohms, ½W	201332-561
R31	5,600 ohms, ½W	201332-562
R32	3,000 ohms, ½W	201332-302
R38	1,000 ohms, ½W	201332-102
R48	Potentiometer, 1k, 20%	928490-102
R57	390 ohms, ½W	201332-391
	SEMICONDUCTORS	
CR1 – CR18, CR20 – CR23	Diodes, 1N916	206105
Q1,3,5,7,9,11,13,14, Q14,17,19	Transistor, 2N3904	207227
Q2,4,6,8,10,12,16, Q18,20	Transistor, 2N3906	207228


162696 RGB OUTPUT BD.
162696B-(*)
C50
C49
R30
R67
R104
C48
C51
C47
Q5
Q11
Q17
Z1
Z2
Z3
40
31
1
3
4
6
7
9
10
12
13
22
23
25
26
30

SHT 5 OF 6 162696

REV	ECO	DESCRIPTION	DFT	CHKD	APPD	DATE
A		NEW DRAWING	vgj			11/6/75
B	6169	R128 WAS 100K R129 WAS 50K DELETED R130	M.E.A.			4/6/76



NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL CAPACITOR VALUES ARE IN MICROFARADS,
2. ALL RESISTOR VALUES ARE IN OHMS, ±5%, ¼W,
3. CIRCUITRY IN SHADED AREAS ARE SHOWN FOR FUNCTIONAL REPRESENTATION ONLY. FOR ACTUAL CIRCUIT, REFER TO APPROPRIATE SCHEMATIC.

△4 USED ON 5500 ONLY.

△5 JUMPER A TO A EXCEPT FOR H.DELAY AUXILIARY BRIGHTNESS.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

PRINT DIST.	USED ON	NEXT ASSY.	MATERIAL
1	TOLERANCES UNLESS OTHERWISE SPECIFIED XX ±.03 ANGULAR ± XXX ±.010 HOLE SIZES ±.005		FINISH
3			
8A	BREAK SHARP EDGES & DEBURR HOLES		
	DO NOT TEMPLATE DRAWING		SCALE

CONRAC

CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE:
SCHEMATIC
RGB OUTPUT BOARD

	NAME	DATE
DRAWN BY	F GEORGE	10-1-74
CHECKED BY		10-29-74
APPD. ENG.		10.28.74
APPD. MECH.		

SIZE D DWG. NUMBER 162696

PARTS LIST, RGB VIDEO AMPLIFIER BOARD, 162696

CAPACITORS

Symbol	Description	Conrac Part No.
Cl, C14, C28	10 µF, electrolytic, 25V	211460
C2, C5, C6, C15, C15, C19, C29, C32, C33, C47	100 µF, electrolytic, 15V	211605-001
C3, C4, C12, C16, C17, C21, C26, C30, C31, C35, C40, C41, C48, C52, C53, C54, C55	0.1 µF, minibox polyester, ± 10%, 100V	211149-104
C7, C20, C34, C44	5 µF, electrolytic, 25V	211410
C8, C22, C36	120 pF, dipped mica, ± 5%, 500V	210345
C9, C23, C37, C45	16 - 150 pF, trimmer	211855
C11, C25, C39	0.47 µF, minibox polyester, ± 10%, 100V	211151-474
C13, C27, C42	10 µF, electrolytic, 35V	211462
C46	.0047 µF, minibox polyester, ± 10%, 630V	211146-472
C49, C50	100 µF, electrolytic, 25V	211615
C51	5 µF, electrolytic, 250V	211426

RESISTORS

NOTE: Unless otherwise indicated, all resistors are replaceable by 1/4W, ± 5%, carbon film units. See schematic diagram for exact values.

Symbol	Description	Conrac Part No.
R3, R14, R40	Resistor, 499 ohms, ± 1%, 1/4W, RN60D type, carbon or metal film	201615
R4, R6, R41, R43	Resistor, 10k, ± 1%, 1/4W, RN60D type, carbon or metal film	202255
R7, R11, R44, R48, R81, R85	Resistor, 2k, ± 1%, 1/4W, RN60D type, carbon or metal film	201909
R8, R45, R82	Resistor, 1k, ± 1%, 1/4W, RN60D type, carbon or metal film	201750
R15, R52, R89	Potentiometer, 100 ohms, PC cermet	928490-101
R24, R61, R98	Potentiometer, 500 ohms, PC cermet	928490-501
R30, R67, R104	Resistor, 4.7k, 4W, ± 10%, metal oxide type	202139
R35, R72, R109	Resistor, 11.5k, ± 1%, 1/4W, RN60D type, carbon or metal film	202289
R36, R73, R110	Resistor, 6.19k, ± 1%, 1/4W, RN60D type, carbon or metal film	202187
R121	Resistor, 510 ohms, $\frac{1}{2}$W, ± 5%, carbon film	201332-511

RESISTORS (Cont.)

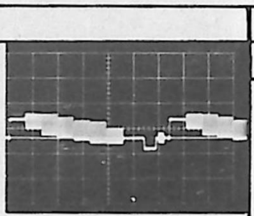
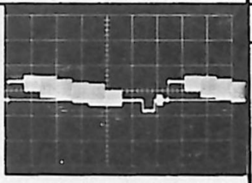
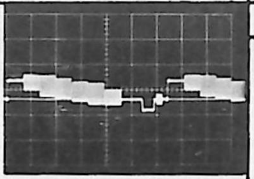
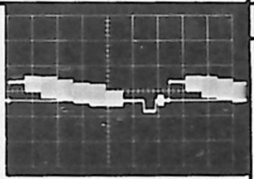
Symbol	Description	Conrac Part No.
R128	Resistor, 196k, ± 1% 1/8W, RN60C type, carbon or metal film	202997-194
R129	Potentiometer, 100k, PC cermet	928490-104
R132, R138	Resistor, 10 ohms, $\frac{1}{2}$W, ± 5%, carbon film	201332-100

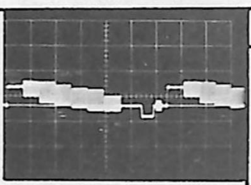
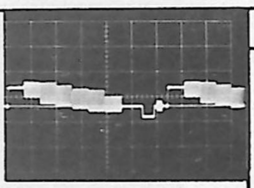
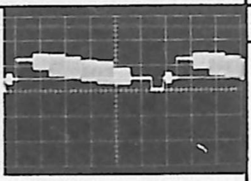
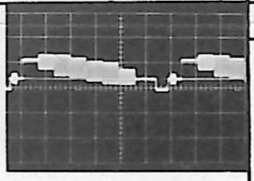
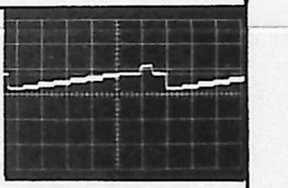
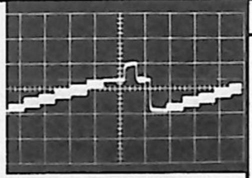
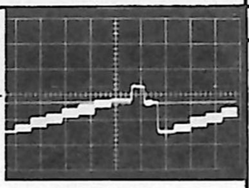
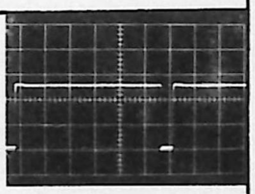
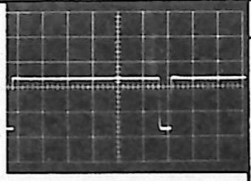
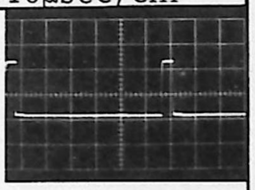
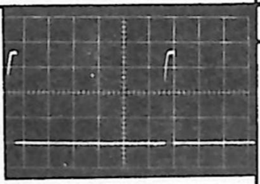
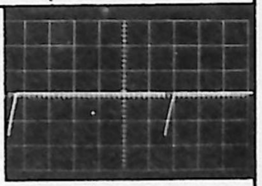
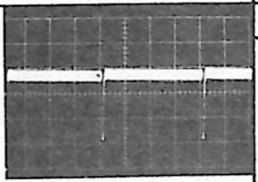
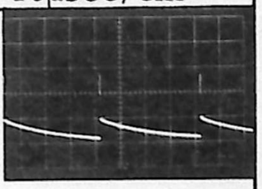
SEMICONDUCTORS

Symbol	Description	Conrac Part No.
CR1 - CR11	Diode, Si, switching, 75V, 10 mA, 1N916	206105
Q1, Q4, Q7, Q10, Q13	Transistor, Si, PNP, 2N3906	207228
Q2, Q3, Q8, Q9, Q14, Q15, Q19, Q22, Q24, Q25, Q26	Transistor, Si, NPN, 2N3904	207227
Q5, Q11, Q17	Transistor, Si, NPN, Motorola type MPS-U10	207259
Q6, Q12, Q18	Transistor, Si, NPN, 2N4265	207232
Z1, Z2, Z3	Integrated Circuit, RCA type CA3026	208026

VIDEO AND SYNC INPUT BOARD 162636

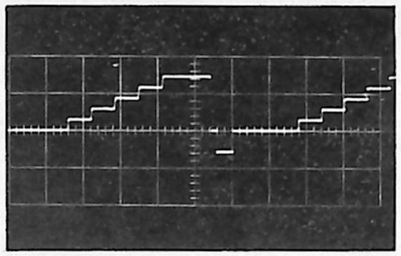
Test Conditions: NTSC color bars at channel A inputs; Channel A selected; internal sync selected.

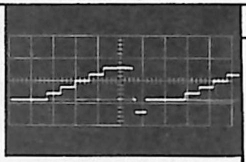
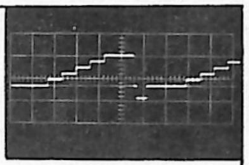
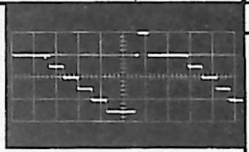
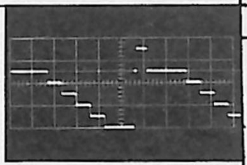
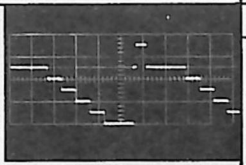
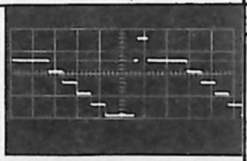
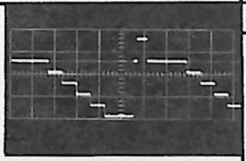
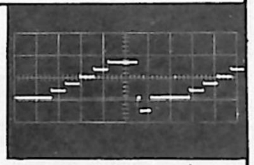
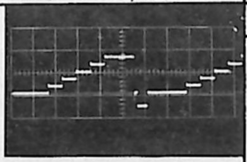
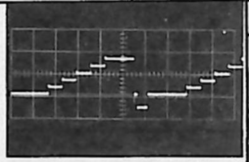
Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3904	Emitter Follower	4.0VDC  V=.5V/cm, H=10μsec/cm	3.3VDC  V=.5V/cm, H=10μsec/cm	20.0VDC
Q2	2N3643	Emitter Follower	3.3VDC  V=.5V/cm, H=10μsec/cm	2.7VDC  V=.5V/cm, H=10μsec/cm	20VDC
Q3	2N3904	Emitter Follower	4.0VDC Q3 identical to Q1 when video signal is on "Test" and "Test" is selected.	3.3VDC	20VDC
Q4	2N3643	Emitter Follower	3.3VDC Q4 identical to Q2 when video signal is on "Test" and "Test" is selected.	6.3VDC	20VDC
Q5	2N3904	Emitter Follower	4.0VDC (Same as Q1 Base)	3.3VDC (Same as Q1 Emitter)	20VDC
Q6	2N3643	Emitter Follower	3.3VDC (Same as Q2 Base)	2.7VDC (Same as Q2 Emitter)	20VDC

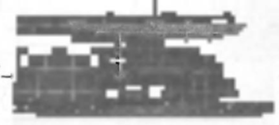
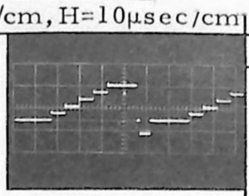
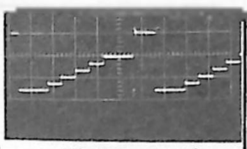
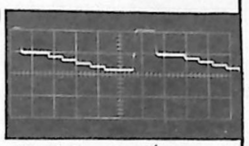
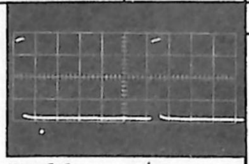
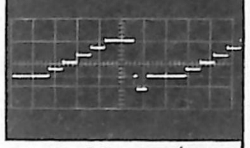
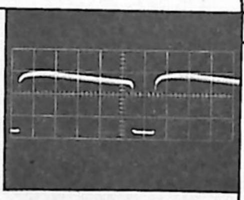
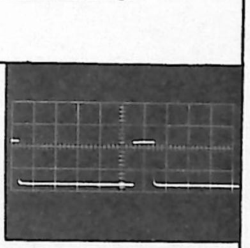
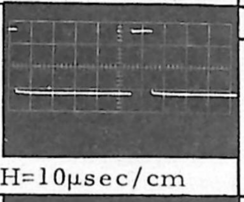
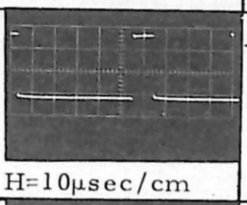
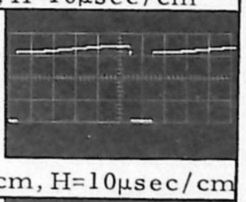
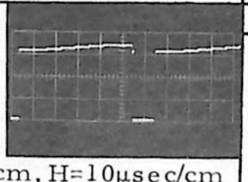
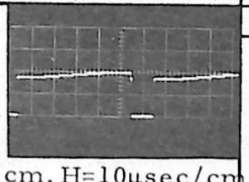
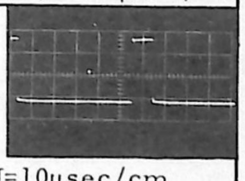
Q7	2N3904	Emitter Follower	Q7 identical to Q5 when video signal is on "Test" and "Test" is selected.		
Q8	2N3643	Emitter Follower	3.3VDC Q8 identical to Q6 when video signal is on "Test" and "Test" is selected.	6.3VDC	20VDC
Q9	2N3904	Emitter Follower	4.0VDC (Same as Q1 Base)	3.3VDC (Same as Q1 Emitter)	20VDC
Q10	2N3643	Emitter Follower	3.3VDC (Same as Q2 Base)	2.7VDC (Same as Q2 Emitter)	20VDC
Q11	2N3904	Emitter Follower	4.0VDC Q11 identical to Q9 when video signal is on "Test" and "Test" is selected.	3.3VDC	20VDC
Q12	2N3643	Emitter Follower	3.3VDC Q12 identical to Q10 when video signal is on "Test" and "Test" is selected.	6.3VDC	20VDC
Q13	2N3904	Emitter Follower	5.0VDC  V=.5V/cm, H=10μsec/cm	4.4VDC  V=.5V/cm, H=10μsec/cm	19VDC
Q14	2N3643	Emitter Follower	5.0VDC	8.2VDC	12VDC
Q15	2N3904	Sync Amplifier	1.75VDC  V=.5V/cm, H=10μsec/cm	1.5VDC  V=.5V/cm, H=10μsec/cm	4.8VDC  V=2V/cm, H=10μsec/cm
Q16	2N3643	Emitter Follower	4.8VDC	4.2VDC  V=2V/cm, H=10μsec/cm	15VDC
Q17	2N3904	Saturable Switch	1.3VDC  V=2V/cm, H=10μsec/cm	0VDC	12VDC  V=5V/cm, H=10μsec/cm
Q18	2N3643	Phase Splitter	12.0VDC	11.5VDC  V=5V/cm, H=10μsec/cm	13.5VDC  V=5V/cm, H=10μsec/cm
Q19	2N3904	Saturable Switch	0.5VDC  V=5V/cm, H=10μsec/cm	0VDC	0.5VDC  V=2V/cm, H=10μsec/cm
Q20	2N3906	Saturable Switch	14.7VDC  V=1V/cm, H=5msec/cm	15.0VDC	2.35VDC  V=5V/cm, H=5msec/cm

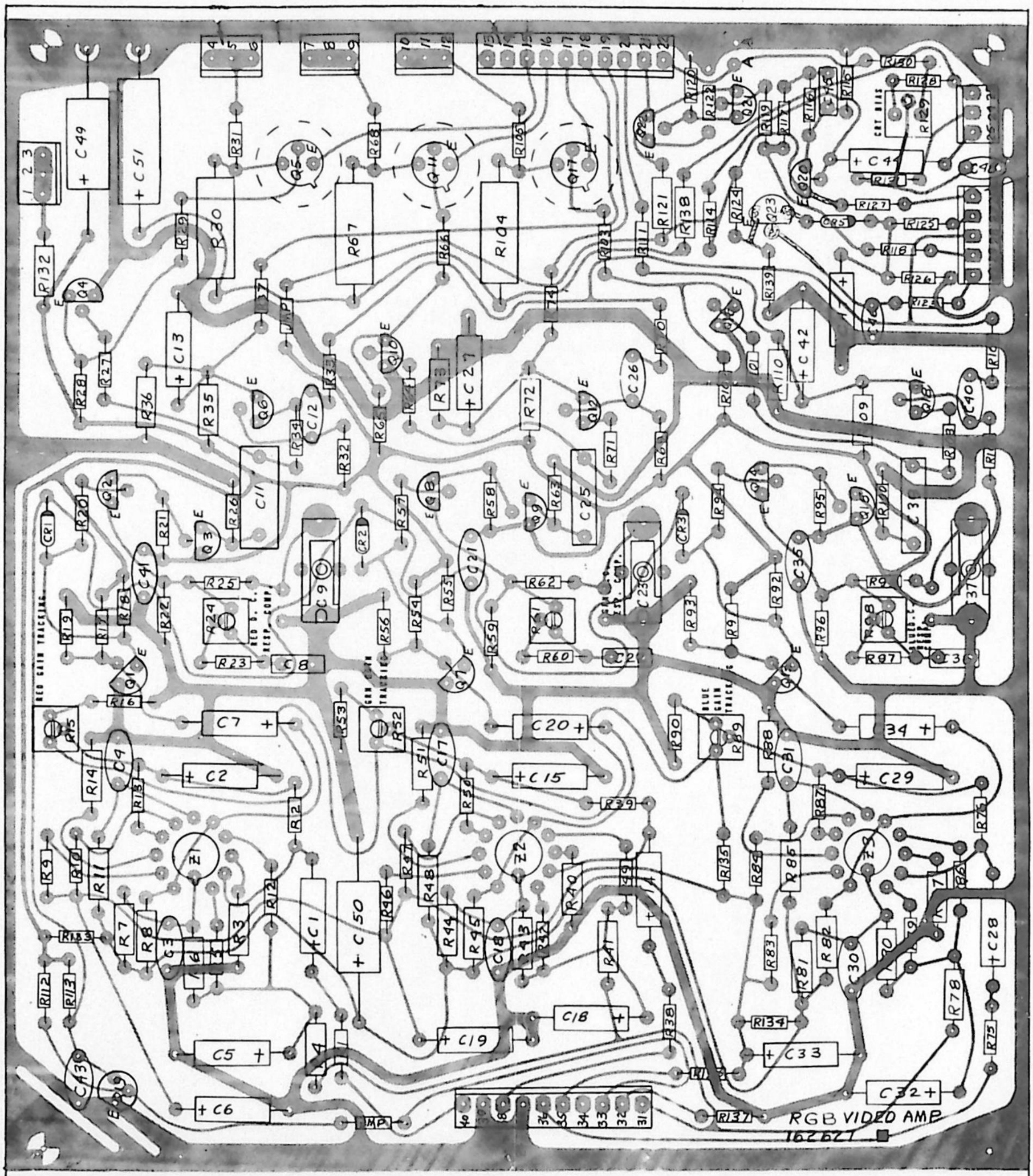
RGB VIDEO AMPLIFIER BOARD, No. 162696 OR 162627

TEST CONDITIONS: Standard Color Bar Test Pattern. DC voltages taken with Simpson-Type 260 Voltmeter. All monitor controls adjusted for normal operation.



Z1 through Z3	CA3026	Gain Control Amplifier	1.5 VDC Pin 1	1.0 VDC Pin 2  V=500mV/cm, H=10µsec/cm	1.0 VDC Pin 3  V=500mV/cm, H=10µsec/cm
			11.5VDC Pin 4	17.9VDC Pin 5  V=200mV/cm, H=10µsec/cm	18.3VDC Pin 6
			11.5VDC Pin 7	1.5VDC Pin 8	1.0VDC Pin 9
			11.5VDC Pin 10	17.9VDC Pin 11 (same as Pin 5)	16.5VDC Pin 12
Symbol	Type	Function	Base	Emitter	Collector
Q1	2N3906	Emitter Follower	3.7VDC  V=200mV/cm, H=10µsec/cm	4.4VDC  V=200mV/cm, H=10µsec/cm	0VDC
Q2	2N3904	Response Compensation Amplifier	4.4VDC  V=200mV/cm, H=10µsec/cm	3.8VDC  V=200mV/cm, H=10µsec/cm	16.5VDC  V=500mV/cm, H=10µsec/cm
Q3	2N3904	Emitter Follower	16.5VDC  V=500mV/cm, H=10µsec/cm	15.6VDC  V=500mV/cm, H=10µsec/cm	22.5VDC

Q4	2N3906	Emitter Follower	8.2VDC V=500mV/cm, H=10µsec/cm	 V=500mV/cm H=1[illegible] sec/cm	
Q5	SE7056	Output Amplifier	8.9VDC  V=500mV/cm, H=10µsec/cm	8.6VDC  V=500mV/cm, H=10µsec/cm	180VDC  V=50V/cm, H=10µsec/cm
Q6	2N4265	Keyed Clamp	1.5VDC  V=2V/cm, H=10µsec/cm	8.2VDC	8.2VDC  V=500mV/cm, H=10µsec/cm
Q7	2N3906	Emitter Follower	3.7VDC (Same as Q1 Base)	4.4VDC (Same as Q1 Emitter)	0VDC
Q8	2N3904	Response Compensation Amplifier	4.4VDC (Same as Q2 Base)	3.8VDC (Same as Q2 Emitter)	16.5VDC (Same as Q2 Collector)
Q9	2N3904	Emitter Follower	16.5VDC (Same as Q3 Base)	15.6VDC (Same as Q3 Emitter)	22.5VDC
Q10	2N3906	Emitter Follower	8.2VDC (Same as Q4 Base)	8.9VDC (Same as Q4 Emitter)	0VDC
Q11	SE7056	Output Amplifier	8.9VDC (Same as Q5 Base)	8.6VDC (Same as Q5 Emitter)	180VDC (Same as Q5 Collector)
Q12	2N4265	Keyed Clamp	1.5VDC (Same as Q6 Base)	8.2VDC	8.2VDC (Same as Q6 Collector)
Q13	2N3906	Emitter Follower	3.7VDC (Same as Q1 Base)	4.4VDC (Same as Q1 Emitter)	0VDC
Q14	2N3904	Response Compensation Amplifier	4.4VDC (Same as Q2 Base)	3.8VDC (Same as Q2 Emitter)	16.5VDC (Same as Q2 Collector)
Q15	2N3904	Emitter Follower	16.5VDC (Same as Q3 Base)	15.6VDC (Same as Q3 Emitter)	22.5VDC
Q16	2N3906	Emitter Follower	8.2VDC (Same as Q4 Base)	8.9VDC (Same as Q4 Emitter)	0VDC
Q17	SE7056	Output Amplifier	8.9VDC (Same as Q5 Base)	8.6VDC (Same as Q5 Emitter)	180VDC (Same as Q5 Collector)
Q18	2N4265	Keyed Clamp	1.5VDC (Same as Q6 Base)	8.2VDC	8.2VDC (Same as Q6 Collector)
Q19	2N3643	Inverter	Operate: 0VDC Setup: 0.7VDC	0VDC	Operate: 20.5VDC Setup: 0.1VDC
Q20	2N3906	Saturable Switch	24VDC  V=1V/cm, H=10µsec/cm	22VDC	6.6VDC  V=10V/cm, H=10µsec/cm
Q21	2N3906	Emitter Follower	8.4VDC  V=1V/cm, H=10µsec/cm	9.0VDC  V=1V/cm, H=10µsec/cm	1.3VDC  V=500mV/cm, H=10µsec/cm
Q22	2N3904	Current Amplifier	1.3VDC  V=500mV/cm, H=10µsec/cm	0.7VDC  V=500mV/cm, H=10µsec/cm	9.0VDC  V=1V/cm, H=10µsec/cm
Q23	2N3906	Emitter Follower	14.5VDC	21VDC	0VDC


RGB VIDEO AMP
162627
RED GAIN TRACKING
RED D.C. RESP. COMP.
GRN GAIN TRACKING
BLUE GAIN TRACKING
CRT BIAS
C49
C51
C13
C11
C12
C27
C26
C25
C9
C8
C7
C2
C4
C41
C17
C20
C15
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C46
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C50
C3
C18
C19
C5
C6
C33
C32
C28
C30
C43
CR1
CR2
CR3
CR5
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q19
Q20
Q21
Q23
Q24
Z1
Z2
Z3
R132
R30
R31
R67
R68
R104
R105
R66
R103
R29
R27
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R36
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R133
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R113
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R139
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R98
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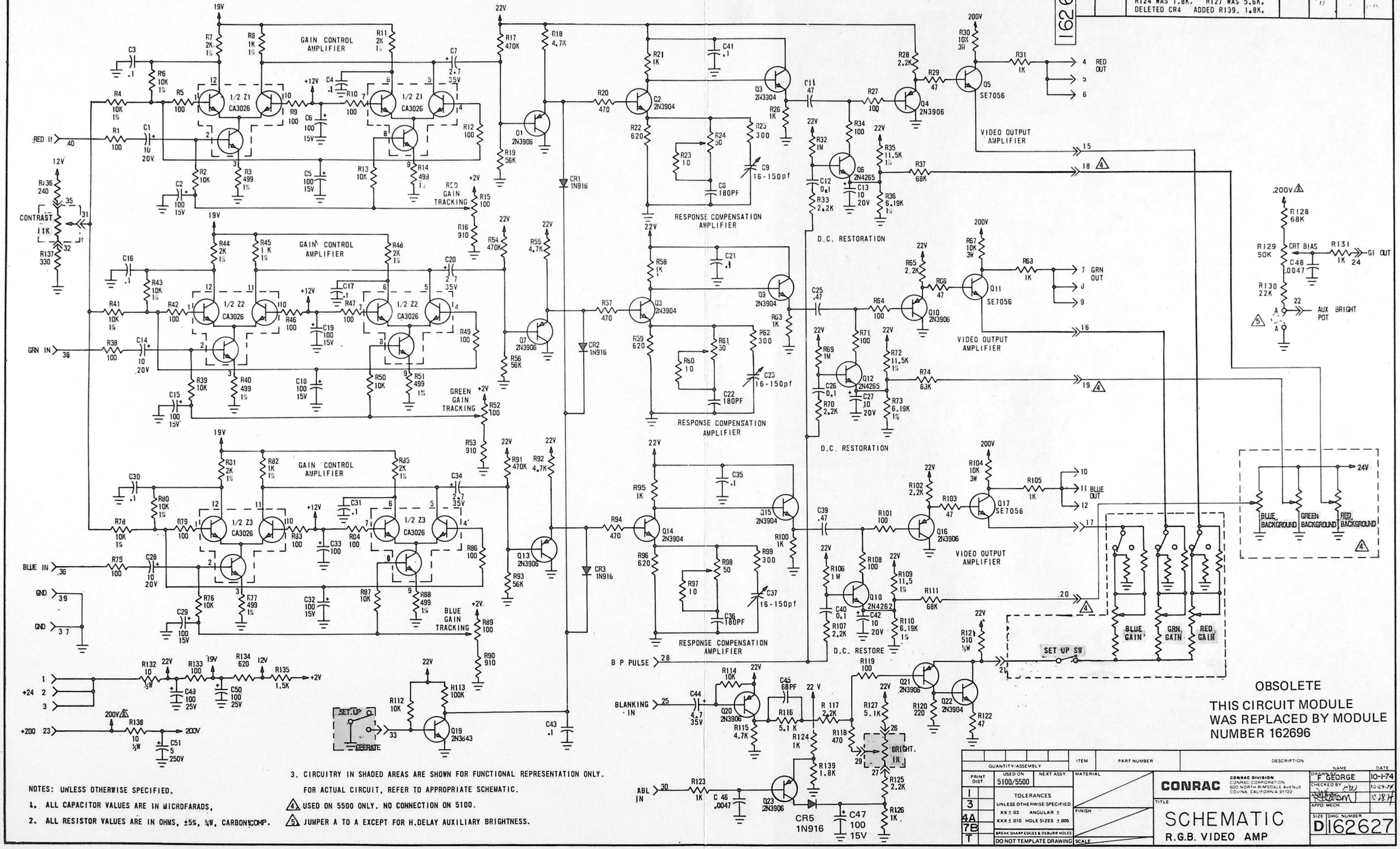
R88
R87
R86
R85
R83
R82
R81
R80
R79
R78
R76
R75
IMP
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15 16 17 18 19 20 21 22
40 39 38 37 36 35 34 33 32 31
E
A

162627	REV	ECO	DESCRIPTION	DFT	CHKD	APPD	DATE
	A	5234	NEW DRAWING				
	B	5342	C7,20 & 34 WERE 2.2, 20V R124 WAS 1.8K. R127 WAS 5.6K. DELETED CR4 ADDED R139, 1.8K.				



OBSOLETE

THIS CIRCUIT MODULE WAS REPLACED BY MODULE NUMBER 162696

NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL CAPACITOR VALUES ARE IN MICROFARADS,
2. ALL RESISTOR VALUES ARE IN OHMS, ±5%, ¼W, CARBON COMP.
3. CIRCUITRY IN SHADED AREAS ARE SHOWN FOR FUNCTIONAL REPRESENTATION ONLY. FOR ACTUAL CIRCUIT, REFER TO APPROPRIATE SCHEMATIC.

△4 USED ON 5500 ONLY. NO CONNECTION ON 5100.

△5 JUMPER A TO A EXCEPT FOR H.DELAY AUXILIARY BRIGHTNESS.

					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

PRINT DIST.	USED ON	NEXT ASSY.	MATERIAL
	5100/5500		
1	TOLERANCES UNLESS OTHERWISE SPECIFIED XX ± .03 ANGULAR ± XXX ± .010 HOLE SIZES ± .005		
3			
4A			FINISH
7B	BREAK SHARP EDGES & DEBURR HOLES		
T	DO NOT TEMPLATE DRAWING		SCALE

CONRAC

CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE
SCHEMATIC
R.G.B. VIDEO AMP

	NAME	DATE
DRAWN BY	F GEORGE	10-1-74
CHECKED BY	FW	10-29-74
APPD		10-28-74
APPD. MECH.		

SIZE D DWG. NUMBER 162627

Symbol	Description	Conrac Part number

BOARD NO. 162627, PARTS LIST

CAPACITORS

C1,13,14,27,28,42	10μF, 20V Tubular Tantalum	211450
C2,5,6,15,18,19,29, C32,33	100μF, 15V Electrolytic, Axial	211605-001
C3,4,12,16,17,21,26, C30,31,35,40,41,43	0.1μF, 75V +80 -30% Ceramic Disc	211080
C7,20,34	2.7μF, 35V Tubular Tantalum	211395
C8,22,36	180pF, 500V, 5% Dipped Mica	210405
C9,23,37	16 – 150pF, Trimmer	211855
C11,25,39	.47μF, 100V, 10% Minibox Polyester	211151-474
C44	4.7μF, 35V, 10% Tubular Tantalum	211406
C45	68μF, 100V, 5% Dipped Mica	210655
C46,48	.0047μF, 500V, 20% Ceramic Disc	210830
C47	47μF, 25V Electrolytic, Axial	211551
C49,50	100μF, 15V Electrolytic, Axial	211615
C51	5μF, 250V Electrolytic, Axial	211426

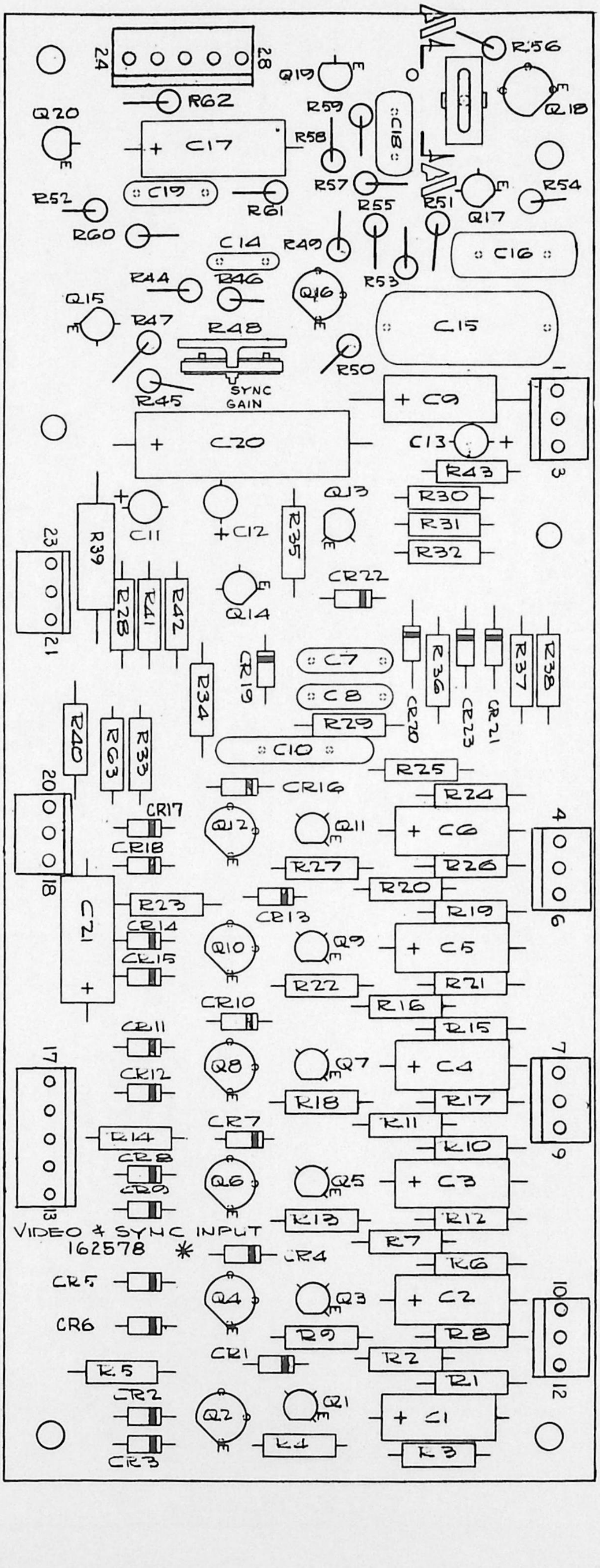
RESISTORS

NOTE: Except as listed below, all resistors are replaceable by ¼W, 5%, carbon composition. Refer to schematic for exact values.

R3,14,40,51,77,88	499 ohm, 1%, RN60D	201615
R4,6,41,43,78,80	10k, 1%, RN60D	202255
R7,11,44,48,81,65	2k, 1%, RN60D	201909
R8,45,82	1k, 1%, RN60D	201909
R15,52,89	Potentiometer, 100 ohm, PC, cermet	928490-101
R24,61,98	Potentiometer, 50 ohm, PC, cermet	928490-500
R30,67,104	10k, 3W, metal oxide	202290
R35,72,109	11.5k, 1%, RN60D	202289
R121	510 ohm, ½W, carbon composition	201617
R129	Potentiometer, 50k, PC, cermet	928490-503
R132,138	10 ohm, ½W, carbon composition	201140

SEMICONDUCTORS

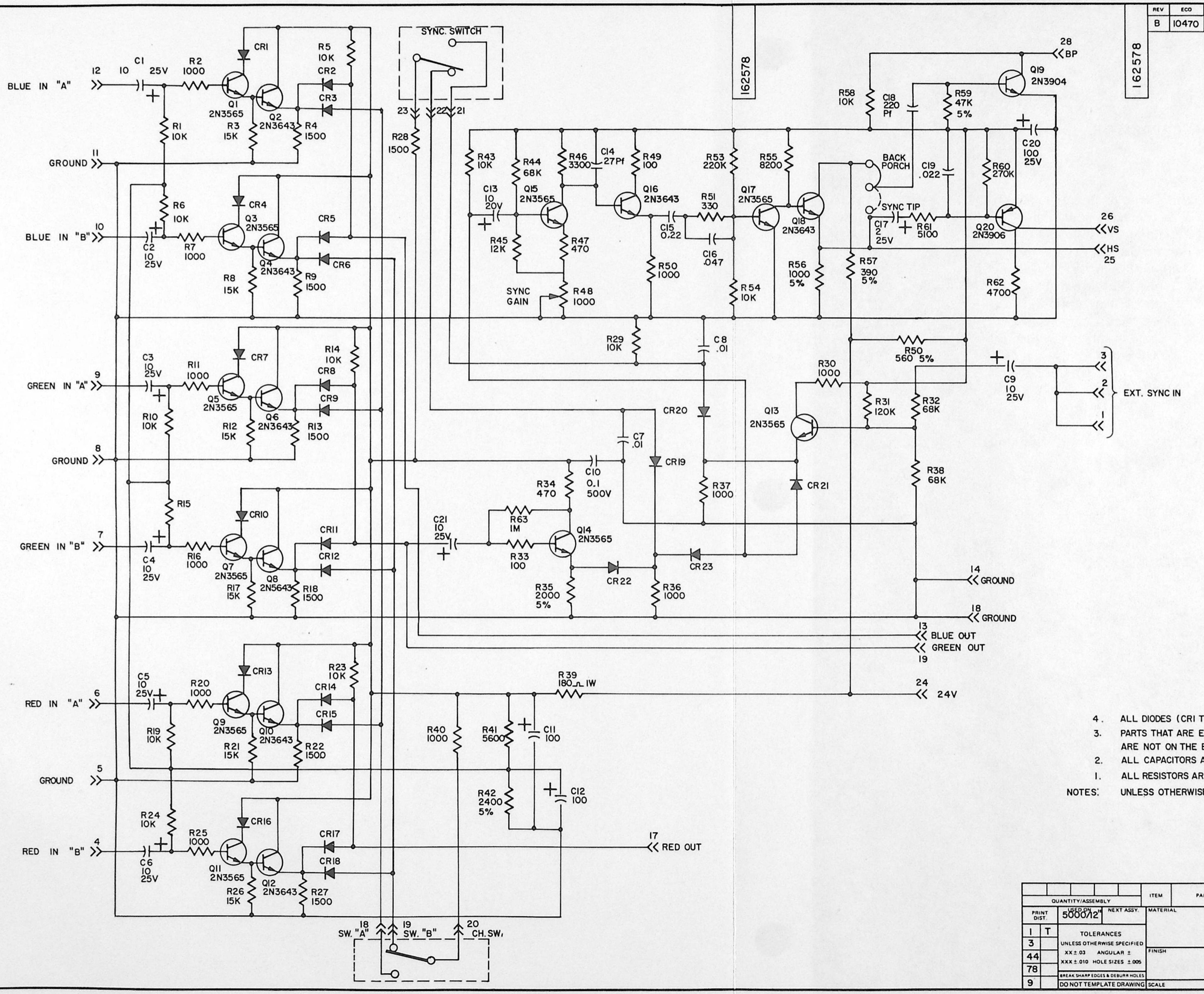
CR1 – CR5	Diode, Si, switching, 1N916	206105
Q1,4,7,10,13,16,20, Q21,23	Transistor, PNP Si, 2N3906	207228
Q2,3,8,9,14,15,22	Transistor, NPN Si, 2N3904	207227
Q5,11,17	Transistor, NPN, Si, Fairchild type SE7056	207212
Q6,12,18	Transistor, NPN, Si, 2N4265	207232
Z1,2,3	I.C., RCA type CA3026	208026


24
28
R56
Q19
R62
Q18
Q20
R59
C17
R58
C18
R57
C19
R61
R54
R52
R55
R51
Q17
R60
R49
C14
C16
R53
R44
R46
Q16
Q15
R47
R48
C15
R50
R45
SYNC
GAIN
C9
C20
C13
R43
3
R30
Q13
C11
C12
R31
R35
R32
23
R39
21
R28
R41
R42
Q14
CR22
CR19
C7
R36
R37
R38
R34
C8
CR20
CR23
CR21
R40
R63
R33
R29
C10
R25
20
CR16
R24
CR17
Q12
Q11
C6
4
18
CR18
R27
R26
6
R20
C21
R23
CR13
R19
CR14
Q10
Q9
C5
CR15
R22
R21
R16
CR10
R15
CR11
7
17
Q8
Q7
C4
CR12
R18
R17
9
R14
CR7
R11
R10
CR8
Q6
Q5
C3
CR9
13
R13
R12
VIDEO & SYNC INPUT
162578
R7
CR4
R6
CR5
Q4
Q3
C2
10
CR6
R9
R8
CR1
R2
R5
R1
12
CR2
Q2
Q1
C1
R4
R3
CR3

REV	ECO	DESCRIPTION	DFT	CHKD	APPD.	DATE
B	10470	C17 & C9 WERE 15V	MRO			

162578

162578



4. ALL DIODES (CR1 THUR CR23) ARE PG 912.
3. PARTS THAT ARE ENCLOSED IN DOTTED BLOCKS, ARE NOT ON THE BOARD.
2. ALL CAPACITORS ARE IN MICROFARADS.
1. ALL RESISTORS ARE IN OHMS 10%, 1/2 W

NOTES: UNLESS OTHERWISE SPECIFIED.

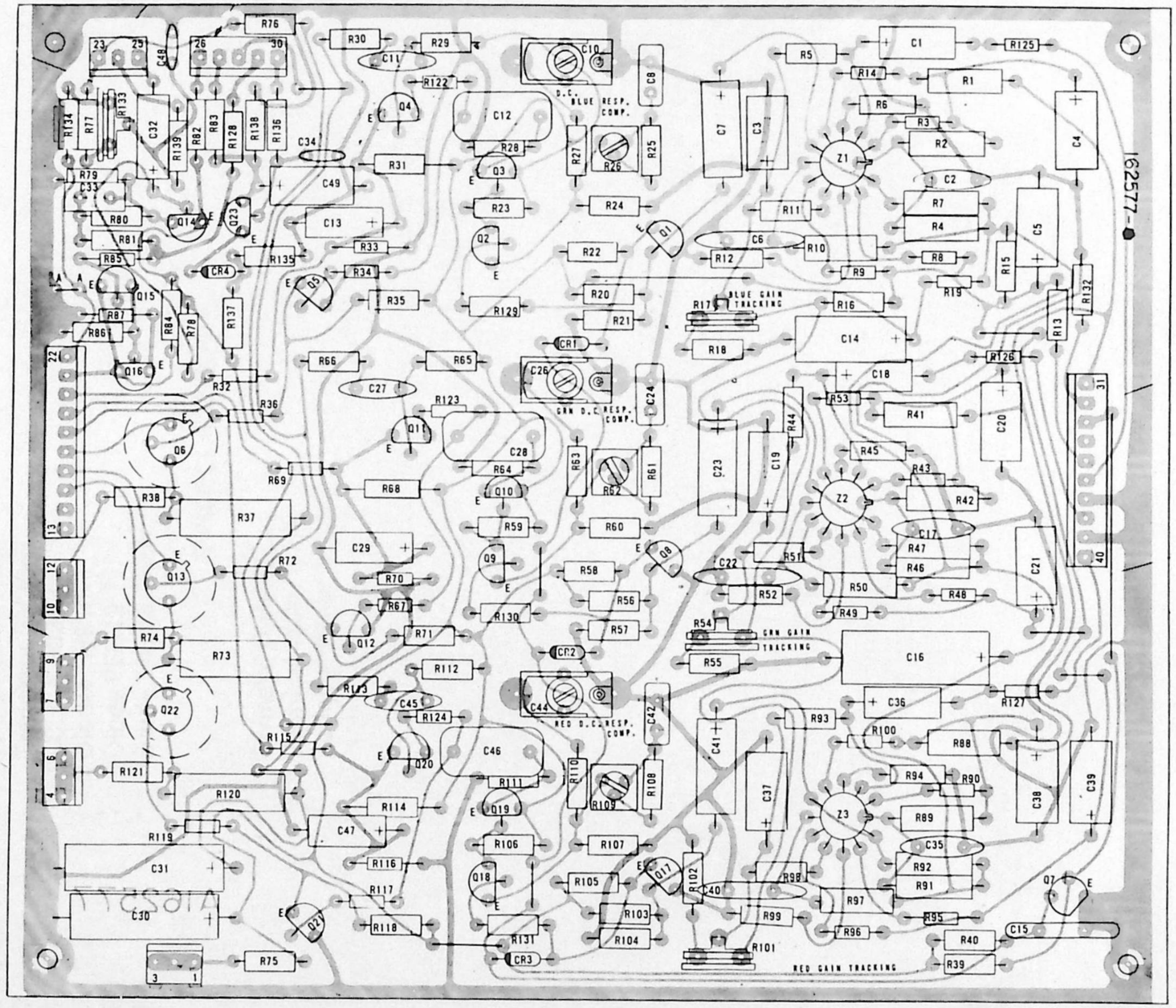
OBSOLETE

THIS CIRCUIT MODULE
WAS REPLACED BY MODULE
NUMBER 162636

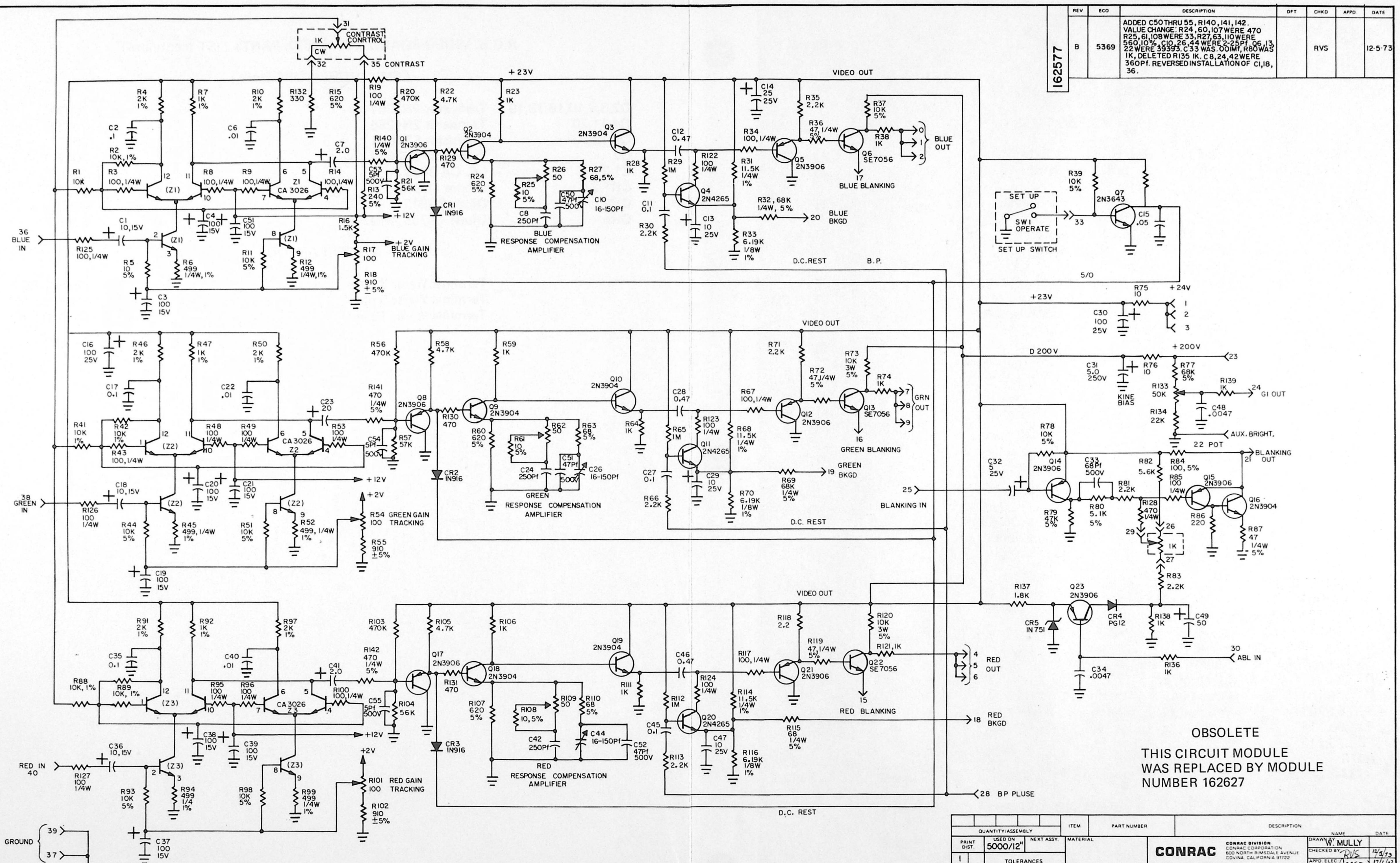
					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

PRINT DIST.		USED ON 5000/12	NEXT ASSY.	MATERIAL	CONRAC DIVISION CONRAC CORPORATION 600 NORTH RIMSDALE AVENUE COVINA, CALIFORNIA 91722		NAME	DATE
1	T	TOLERANCES UNLESS OTHERWISE SPECIFIED			**CONRAC**	DRAWN BY	W. MULLY	5-17-73
3		XX ± .03 ANGULAR ±				CHECKED BY	RVS	12-6-73
44		XXX ± .010 HOLE SIZES ± .005		FINISH	TITLE VIDEO & SYNC. INPUT SCHEMATIC RGB	APPD. ELEC.	RC	12-6-73
78		BREAK SHARP EDGES & DEBURR HOLES				APPD. MECH.	DEC. 6 '73	
9		DO NOT TEMPLATE DRAWING		SCALE		SIZE D	DWG. NUMBER 162578	

Symbol	Description	Conrac Part number
	VIDEO AND SYNC INPUT BOARD 162578, PARTS LIST	
	CAPACITORS	
C1 – C6,9,21	10μF, 25V, 20% Electrolytic, Axial	211460
C7,8	.01μF, 500V, 20% Ceramic Disc	210900
C10	.1μF, 500V, +80 -20% Ceramic Disc	211110
C11,12	100μF, 25V, +80 -20% Electrolytic, Axial	211616
C13	10μF, 20V +80 -20% Dipped Tantalum	211443
C14	27pF, 500V, 5% Ceramic Disc NPO	210130
C15	.22μF, 200V, 10% Dipped Polyester	211267
C16	.047μF, 200V, 10% Dipped Polyester	211044
C17	2μF, 25V, 20%, Aluminum Electrolytic	211365
C18	220pF, 500V, 5% Dipped Mica	210425
C19	.022μF, 400V, 10% Dipped Metalized Polyester	210954
C20	100μF, 25V, -10% +75% Electrolytic, Axial	211615
	RESISTORS	
	NOTE: Except as listed below, all resistors are replaceable by ½W, 5%, carbon composition units. Refer to schematic for exact value.	
R39	180 ohms, 1W	201425
R48	Potentiometer, 1000 ohms, ±20%	928237
	SEMICONDUCTORS	
Q1,3,5,7,9,11,13,14, Q15,17	Transistors, 2N3565	207175
Q2,4,6,8,10,12,16,18	Transistors, 2N3643	207205
Q19	Transistor, 2N3904	207227
Q20	Transistor, 2N3906	207228
CR1 – CR23	Diodes, PG912	206106


D.C. BLUE RESP. COMP.
BLUE GAIN TRACKING
GRN D.C. RESP. COMP.
GRN GAIN TRACKING
RED D.C. RESP. COMP.
RED GAIN TRACKING
162577-

162577	REV	ECO	DESCRIPTION	DFT	CHKD	APPD	DATE
	B	5369	ADDED C50 THRU 55, R140, 141, 142. VALUE CHANGE: R24, 60, 107 WERE 470 R25, 61, 108 WERE 33, R27, 63, 110 WERE 560, 10%, C10, 26, 44 WERE 2-25Pf. Q6, 13, 22 WERE 39393. C33 WAS .001Mf, R80 WAS 1K, DELETED R135 1K. C8, 24, 42 WERE 360Pf. REVERSED INSTALLATION OF C1, 18, 36.		RVS		12·5·73



OBSOLETE

THIS CIRCUIT MODULE
WAS REPLACED BY MODULE
NUMBER 162627

3. PARTS THAT ARE ENCLOSED IN DOTTED BLOCKS ARE NOT ON BOARD.
2. ALL CAPACITORS ARE IN MICROFARADS.
1. ALL RESISTORS ARE IN OHMS 10%, 1/2W
NOTES:

					ITEM	PART NUMBER	DESCRIPTION
QUANTITY/ASSEMBLY							

PRINT DIST.	USED ON	NEXT ASSY.	MATERIAL		
	5000/12"			**CONRAC** CONRAC DIVISION CONRAC CORPORATION 600 NORTH RIMSDALE AVENUE COVINA, CALIFORNIA 91722	
1	TOLERANCES UNLESS OTHERWISE SPECIFIED XX ± .03 ANGULAR ± XXX ± .010 HOLE SIZES ± .005		FINISH	TITLE SCHEMATIC, RGB VIDEO AMPLIFIER	
3					
4A					
7B	BREAK SHARP EDGES & DEBURR HOLES				
T	DO NOT TEMPLATE DRAWING		SCALE		

	NAME	DATE
DRAWN BY	W. MULLY	
CHECKED BY	RVS	12/5/73
APPD. ELEC	CARSON	12/6/73
APPD. MECH	12-6-73	
SIZE D	DWG. NUMBER 162577	

Symbol	Description	Conrac Part number
	R.G.B. VIDEO BOARD NO. 162577, PARTS LIST	
	CAPACITORS	
C1,18,36	10μF, 15V Electrolytic	211445
C2,11,17,27,34,45	.1μF, 75V +80 -30% Ceramic Disc	211080
C3,4,5,19,20,21,37, C38,39	100μF, 15V, -10% +75% Electrolytic, Axial	211605-001
C6,22,40	.01μF, 500V, 10% Ceramic Disc	210895
C7,23,41	2μF, 150V, -10% +75% Electrolytic, Axial	211375
C8,24,42	250pF, 500V, 5% Dipped Mica	210452
C10,26,44	16—150pF, Trimmer	211855
C12,28,46	.47μF, 200V, 10% Dipped Metalized Polyester	211151-474
C13,29,47	10μF, 25V, -10% +75% Electrolytic, Axial	211460
C14	25μF, 25V, -10% +75% Electrolytic, Axial	211530
C15	.05μF, 1000V Ceramic Disc Z5U	211045
C16,30	100μF, 25V, -10% +75% Electrolytic, Axial	211615
C31	5μF, 250V, -10% +75% Electrolytic, Axial	211426
C32	5μF, 25V, -10% +75% Electrolytic, Axial	211410
C33	68pF, 500V, 5% Dipped Mica	210250
C34, 48	.0047μF, 500V, 20% Ceramic Disc Z5U	210830
C49	50μF, 25V Electrolytic	211558
C50,51,52	47pF, 500V, 5% Dipped Mica	210195
C53,54,55	5pF, 500V Dipped Mica	210035
	RESISTORS	
	NOTE: Except as listed below, all resistors are replaceable by ½W, 5%, carbon composition units. Refer to schematic for exact value.	
R1,2,41,42,88,89	10k ohms, 1%	202256
R3,8,9,14,19,34,43, R48,49,53,67,85,90,95, R96,100,117,122—127,	100 ohms, ¼W	201356
R4,10,46,50,91,97	2K ohms, 1%	201910
R6,12,45,52,94,99	499 ohms, ¼W, 1%	201615
R7,47,92	1k ohms, 1%	201758
R17,54,101	Potentiometer, 100 ohms CTS	928236
R26,62,109	Potentiometer, 50 ohms Beckman 72-P	928490-500
R31,68,114	11,500 ohms, ¼W, 1%	202289
R33,70,116	6,190 ohms, 1/8W, 1%	202188
R128	470 ohms, ¼W	201586
R133	Potentiometer, 50k ohms CTS, 30%	928240
	SEMICONDUCTORS	
Q1,5,8,12,14,15,17, Q21,23	Transistor 2N3906	207228

Scan Board E version-R   Conrac 5532-12   SN 308837
RS

Pins with Bad Solder Joints

1 H.regulator Cap

10 width Pot

11 Convergence Modulator

12 Gnd

13 Comp Blanking

14 V size in Underscan

15 V output Q1 Emitter

16 V output Q1 Base

17 V Delay Switch

18 GND

19 VsyNc IN

20 V Hold

41 Neck twist

51 H output Q2 Emitter

40 Neck twist

✓ V Rolls Bad.

✓ Red MisRegistration

- Red Color in Whites

- Intermittent Blanking

✓ Overall Size Changes.

COMPUTER IMAGE CORPORATION

MAINTENANCE REPORT

SYSTEM

LOCATION

SUB ASSEMBLY

SERIAL NO.

TECHNICIAN

DATE

REPAIR TIME

PROBLEM:

SOLUTION:

PARTS REPLACED:

Schematic No.	Component	Description

TYPE 106390 VECTOR OUTPUT MODULE

GENERAL DESCRIPTION

The Conrac 106390 vector output module is a self-contained, color difference (R-Y, B-Y) decoder, with provision for an external subcarrier reference input. The module is designed to operate inside Conrac color video monitors, or wherever the necessary inputs are available. The module will drive a suitable x-y display device to show the vector relationships of the chrominance signal.

CIRCUIT DESCRIPTION

Chroma Input

Composite video is applied through the input connector at pin 1 of J7 to the base of Q1, a tuned collector amplifier. The pass band of Q1 is determined by the tuned circuits around L1 and L2, and is chosen to be the required chroma bandwidth. Emitter follower Q2 provides isolation and attenuation to the appropriate levels to drive the synchronous detector, Z1. A sample of the input chroma signal is also supplied to the diode sync selection gate for internal synchronization of the subcarrier regenerator.

Subcarrier Regenerator

The color reference subcarrier is generated by Z4, which is a phase locked loop, a phase detector, and a corrector. The output of the crystal controlled oscillator is fed back to the phase detector and compared to the sync reference input (from the sync selection diode gate). The phase locked output is amplified in Q13, driven into the reference delay line to obtain proper quadrature delay and fed to Z1, the detector.

Subcarrier Synchronization

The subcarrier is locked to the burst reference contained on the composite input signal when the sync select switch is in the internal position. This allows a sample of the input signal to flow through diodes CR8, CR10, to Pin 13 of Z4.

The subcarrier is locked to an external reference when the sync select switch is in the external position. This provides a sample of the external reference signal from the 360° phase shifter to be applied through diodes CR11, CR13, to Pin 13 of Z4.

360° Phase Shifter

The external subcarrier reference signal is used to modulate the constant current source of the differential amplifier Z2. This modulated current is divided through the differential transistors in proportion to the ratio of their base currents. The divided currents are applied to either end of L5 where they are added algebraically. There is approximately a 180° phase difference across L5 and so the phase of the resulting sum is proportional to the currents through each half. Adjusting the front panel, fine phase control, changes the output signal. Practical requirements limit the maximum shift to about 90°. The output of the 90° phase shifter is fed to a 360° delay line tapped at 60° intervals. Each tap is connected to an input of the COS-MOS 1 of 6 decoder Z3, which selects one of the taps to be fed to the output, according to the logic levels at Pin 9, 10, and 11. The output at Pin 3 is buffered in Q11 and drives the external side of the sync selection gate.

Demodulator

Demodulation of the chrominance information occurs in Z1. Z1 contains two synchronous decoders. The synchronous decoders (one for U-channel and one for V-channel information) multiply the appropriate reference subcarrier from the subcarrier regenerator times the chrominance information in each channel. In this way, the vector product (which includes phase and amplitude infor-

TYPE 106390 VECTOR OUTPUT MODULE

GENERAL DESCRIPTION

The Conrac 106390 vector output module is a self-contained, color difference (R-Y, B-Y) decoder, with provision for an external subcarrier reference input. The module is designed to operate inside Conrac color video monitors, or wherever the necessary inputs are available. The module will drive a suitable x-y display device to show the vector relationships of the chrominance signal.

CIRCUIT DESCRIPTION

Chroma Input

Composite video is applied through the input connector at pin 1 of J7 to the base of Q1, a tuned collector amplifier. The pass band of Q1 is determined by the tuned circuits around L1 and L2, and is chosen to be the required chroma bandwidth. Emitter follower Q2 provides isolation and attenuation to the appropriate levels to drive the synchronous detector, Z1. A sample of the input chroma signal is also supplied to the diode sync selection gate for internal synchronization of the subcarrier regenerator.

Subcarrier Regenerator

The color reference subcarrier is generated by Z4, which is a phase locked loop, a phase detector, and a corrector. The output of the crystal controlled oscillator is fed back to the phase detector and compared to the sync reference input (from the sync selection diode gate). The phase locked output is amplified in Q13, driven into the reference delay line to obtain proper quadrature delay and fed to Z1, the detector.

Subcarrier Synchronization

The subcarrier is locked to the burst reference contained on the composite input signal when the sync select switch is in the internal position. This allows a sample of the input signal to flow through diodes CR8, CR10, to Pin 13 of Z4.

The subcarrier is locked to an external reference when the sync select switch is in the external position. This provides a sample of the external reference signal from the 360° phase shifter to be applied through diodes CR11, CR13, to Pin 13 of Z4.

360° Phase Shifter

The external subcarrier reference signal is used to modulate the constant current source of the differential amplifier Z2. This modulated current is divided through the differential transistors in proportion to the ratio of their base currents. The divided currents are applied to either end of L5 where they are added algebraically. There is approximately a 180° phase difference across L5 and so the phase of the resulting sum is proportional to the currents through each half. Adjusting the front panel, fine phase control, changes the output signal. Practical requirements limit the maximum shift to about 90°. The output of the 90° phase shifter is fed to a 360° delay line tapped at 60° intervals. Each tap is connected to an input of the COS-MOS 1 of 6 decoder Z3, which selects one of the taps to be fed to the output, according to the logic levels at Pin 9, 10, and 11. The output at Pin 3 is buffered in Q11 and drives the external side of the sync selection gate.

Demodulator

Demodulation of the chrominance information occurs in Z1. Z1 contains two synchronous decoders. The synchronous decoders (one for U-channel and one for V-channel information) multiply the appropriate reference subcarrier from the subcarrier regenerator times the chrominance information in each channel. In this way, the vector product (which includes phase and amplitude information) of the two signals, appears at the output. This is now red minus luminance (R-Y) in the V-channel and blue minus luminance (B-Y) in the U-channel. Due to the nature of the decoders, this signal also contains the second harmonic of the subcarrier. These two color difference signals are then algebraically added in the output matrix in proper amounts to produce the G-Y color difference signal. The three color difference signals are filtered by L3, L7, and L12, to remove the second harmonic component and leave the pure color difference signals.

Output Clamps and Drivers

The filtered chroma difference signals are ac coupled to the collectors of clamp transistors Q6 and Q7. The clamps are keyed at sync time by the pulse generated by Q5. The reference for the clamps is generated by Q8. The clamped signals are applied to the compound emitter followers Q3, Q4, and Q9, Q10, to lower output impedance. The output gain trim pots provide approximately 3dB adjustment of gain.

TEST AND ALIGNMENT

VECTOR OUTPUT MODULE

1. Apply standard color bar signal (1 volt p-p) to monitor input. Allow equipment to warm up thoroughly, at least ½ hour.

Caution

> The vector module is used as a measuring instrument. It is important that its calibration be correct. The color bar signal *MUST* conform to FCC Specifications. This can be verified by using the Tektronix model 520 Vectorscope to measure the signal at the input to the Monitor under test. *All vectors must fall within the small tolerance boxes and the level must be 1 volt p-p.*

2. Adjust R46 and R47 to center the vector display. The center dot must fall exactly on the cross hairs of the graticule.
3. Adjust R6 to produce approximately the correct amplitude of all vectors.
4. If necessary, adjust L4, or C26 to produce correct phase of red and cyan vectors. *(Note: C26 is a vernier, or fine adjustment and has the same effect as L4, coarse adjustment.)*
5. If necessary, touch up adjustment of L5 to produce correct phase of the yellow and blue vectors.
6. If necessary, adjust R48 to correct amplitude of vectors along the X axis and R49 to produce the correct amplitude of vectors along the Y axis.
7. Repeat the above adjustments until all vectors are within the small tolerance boxes on the graticule.

Acceptance Criteria

1. All color bar vectors must fall within the small FCC tolerance boxes.
2. The vectors must not shift by more than 1° when the signal is attenuated 3 dB.
3. The color oscillator must remain in sync when the signal is attenuated 9 dB.
4. The vector must remain in the tolerance boxes with the "H-Delay" switch in either position, and with the horizontal hold control misadjusted.

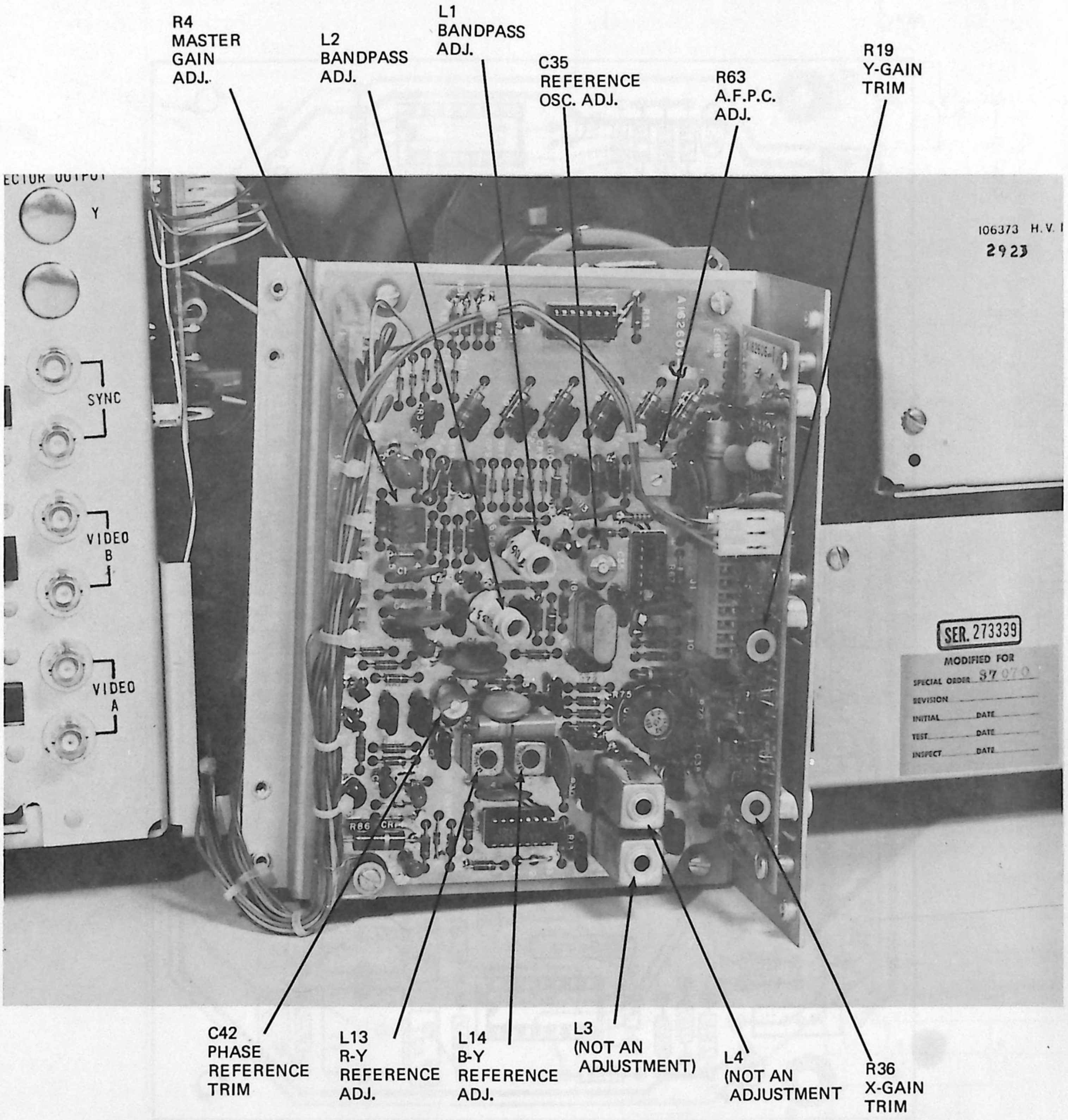
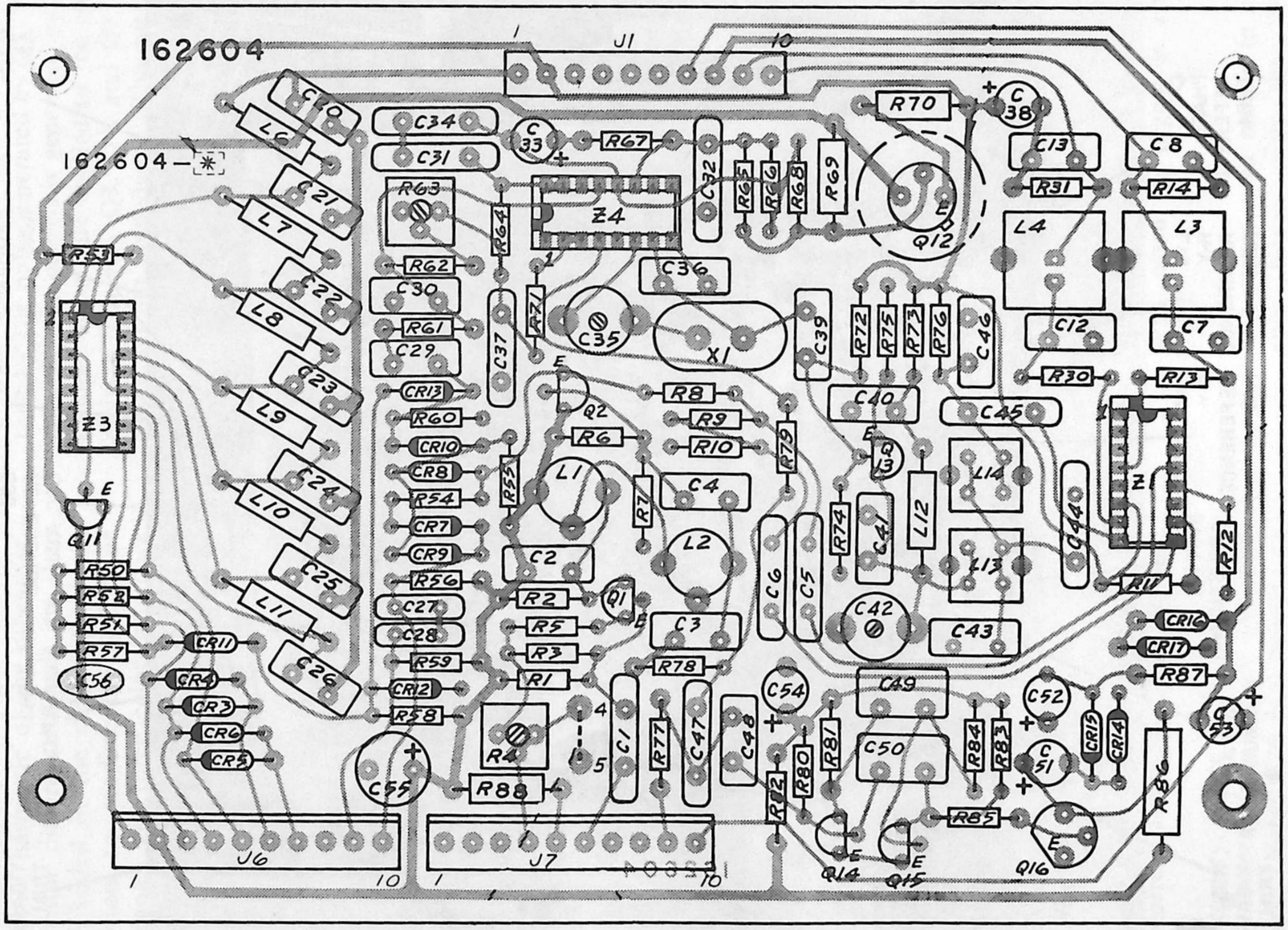
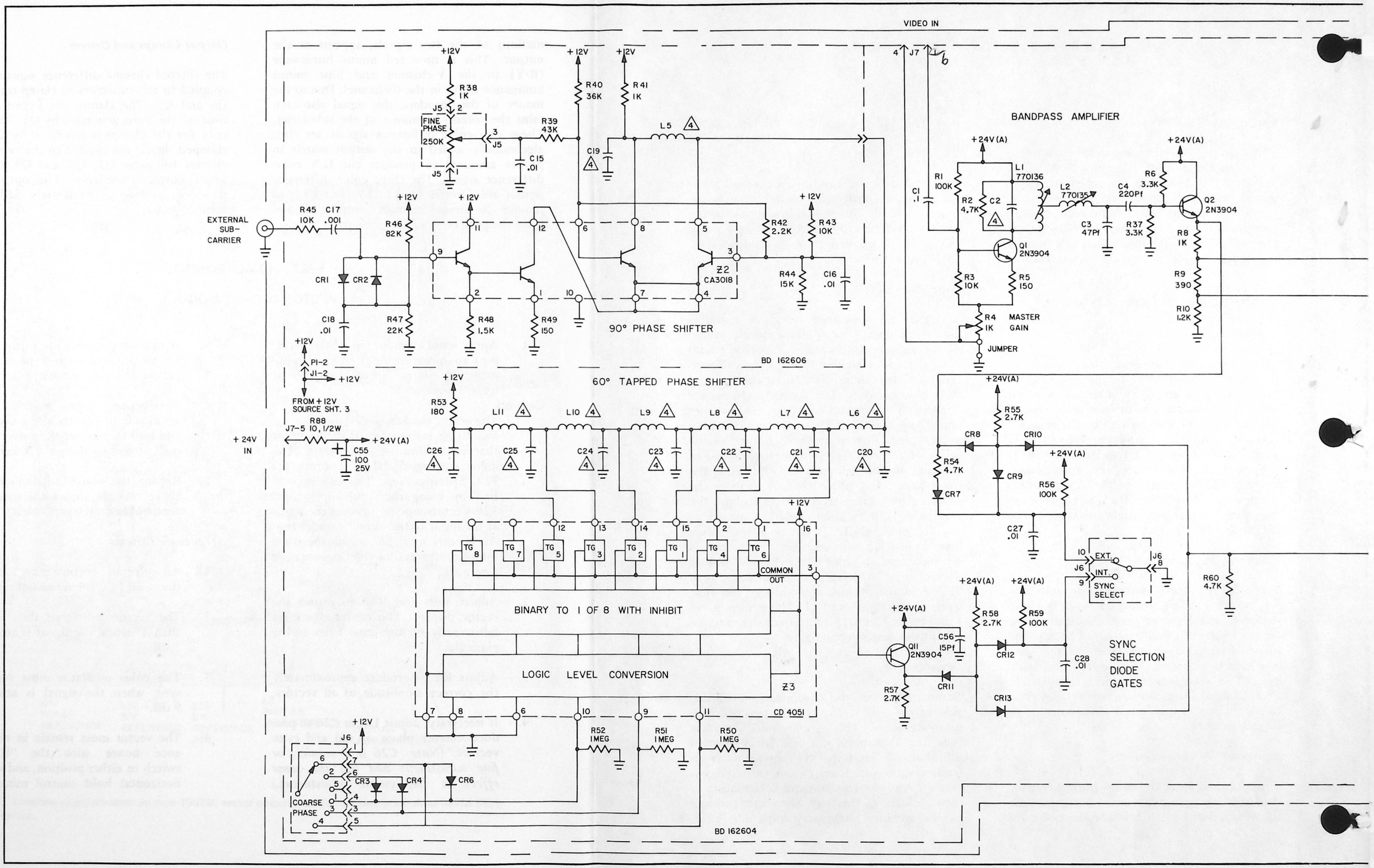
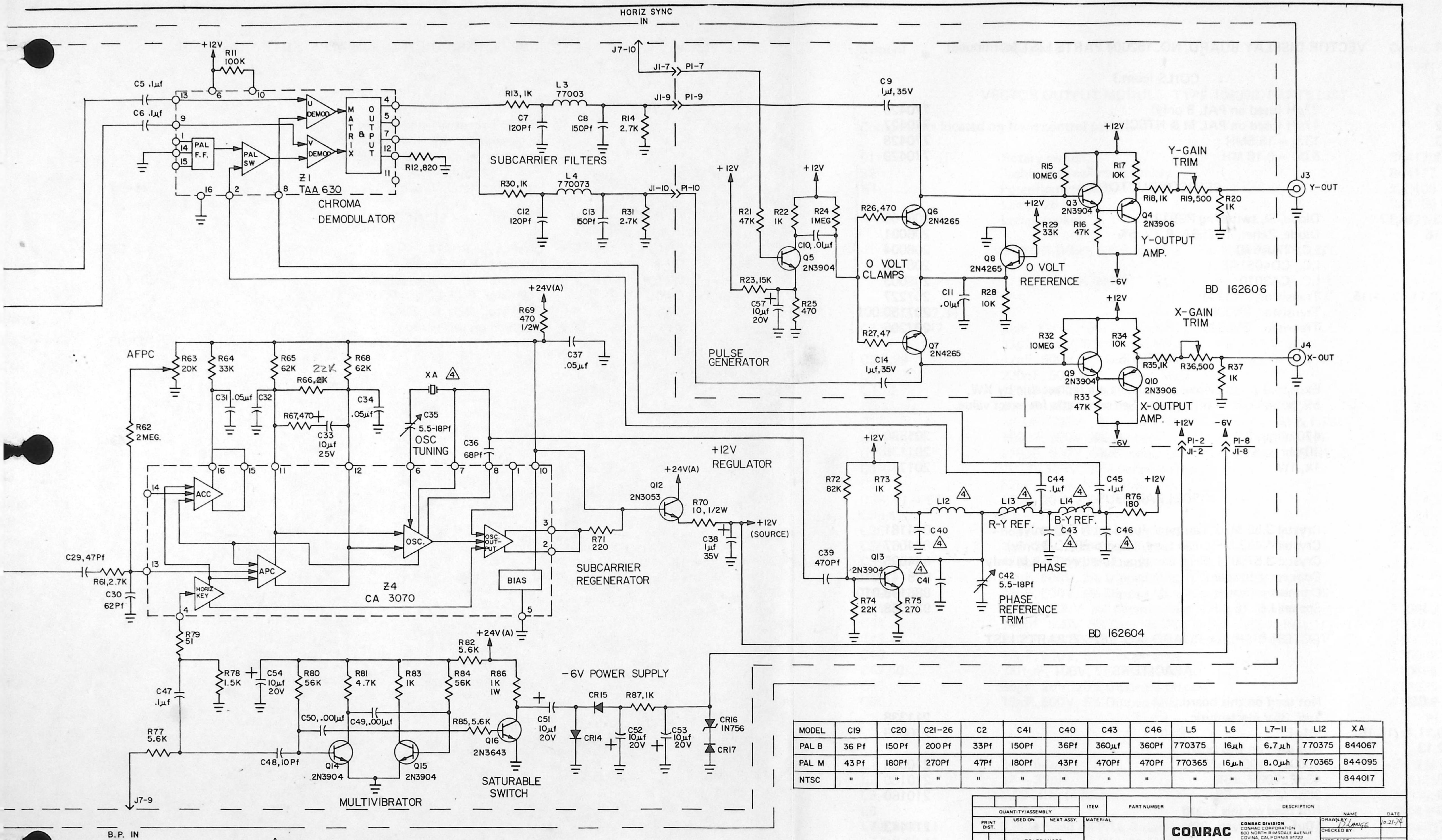


Figure 1. Location of adjustments on type 106390 vector output module installed in a Conrac model 5532 Color monitor.


162604
J1
1
10
C20
L6
C34
C31
C33
R67
C32
R65
R66
R68
R69
R70
C38
C13
C8
R31
R14
L4
L3
162604
C21
L7
R63
R64
Z4
Q12
R53
C22
L8
R62
C30
R61
C29
C36
C35
X1
C39
R72
R75
R73
R76
C46
C12
C7
R30
R13
Z3
C23
L9
R71
C37
CR13
R60
CR10
CR8
R54
CR7
CR9
R56
Q2
R8
R6
R9
R10
R79
C40
C45
Q13
L14
Z1
C24
L10
R55
L1
R7
C4
R74
C41
L12
C44
R12
Q11
R50
R52
R51
R57
C56
C25
L11
C2
L2
C6
C5
L13
R11
C27
C28
R2
Q1
R5
R3
C3
C42
C43
CR16
CR17
R87
CR11
CR4
CR3
CR6
CR5
C26
R59
R1
R78
C54
C49
C52
CR12
R58
R4
C1
R77
C47
C48
R81
R80
C50
R84
R83
C51
CR15
CR14
R86
C53
C55
R88
R82
R85
Q14
Q15
Q16
J6
J7
162604


VIDEO IN
J7
BANDPASS AMPLIFIER
EXTERNAL SUB-CARRIER
R45 10K
C17 .001
+12V
R38 1K
J5
FINE PHASE 250K
R39 43K
C15 .01
R40 36K
R41 1K
L5
C19
R46 82K
CR1
CR2
C18 .01
R47 22K
R48 1.5K
R49 150
R42 2.2K
R43 10K
R44 15K
C16 .01
Z2 CA3018
90° PHASE SHIFTER
BD 162606
60° TAPPED PHASE SHIFTER
P1-2
J1-2
FROM +12V SOURCE SHT. 3
R53 180
+24V IN
J7-5
R88 10, 1/2W
+24V(A)
C55 100 25V
L11
L10
L9
L8
L7
L6
C26
C25
C24
C23
C22
C21
C20
TG 8
TG 7
TG 5
TG 3
TG 2
TG 1
TG 4
TG 6
COMMON OUT
BINARY TO 1 OF 8 WITH INHIBIT
LOGIC LEVEL CONVERSION
Z3
CD 4051
R52 1MEG
R51 1MEG
R50 1MEG
J6
COARSE PHASE
CR3
CR4
CR6
BD 162604
C1 .1
R1 100K
R2 4.7K
C2
L1 770136
L2 770135
C4 220Pf
C3 47Pf
R37 3.3K
R6 3.3K
Q2 2N3904
Q1 2N3904
R3 10K
R5 150
R4 1K MASTER GAIN
JUMPER
R8 1K
R9 390
R10 1.2K
R55 2.7K
CR8
CR10
R54 4.7K
CR9
CR7
R56 100K
C27 .01
EXT.
INT.
SYNC SELECT
R60 4.7K
R58 2.7K
R59 100K
Q11 2N3904
C56 15Pf
CR12
C28 .01
CR11
R57 2.7K
CR13
SYNC SELECTION DIODE GATES



MODEL	C19	C20	C21-26	C2	C41	C40	C43	C46	L5	L6	L7-11	L12	XA
PAL B	36 Pf	150Pf	200 Pf	33Pf	150Pf	36Pf	360µf	360Pf	770375	16µh	6.7µh	770375	844067
PAL M	43Pf	180Pf	270Pf	47Pf	180Pf	43Pf	470Pf	470Pf	770365	16µh	8.0µh	770365	844095
NTSC	"	"	"	"	"	"	"	"	"	"	"	"	844017

4 REFER TO TABLE FOR VALUES
3 ALL DIODES ARE PG 912 /1N916
2 ALL CAPACITOR VALUES ARE IN MICRO-FARADS 10%
1 ALL RESISTOR VALUES ARE IN OHMS 1/4W 5%
NOTES: UNLESS OTHERWISE SPECIFIED.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION

PRINT DIST.
USED ON
NEXT ASSY.
MATERIAL
FINISH
SCALE

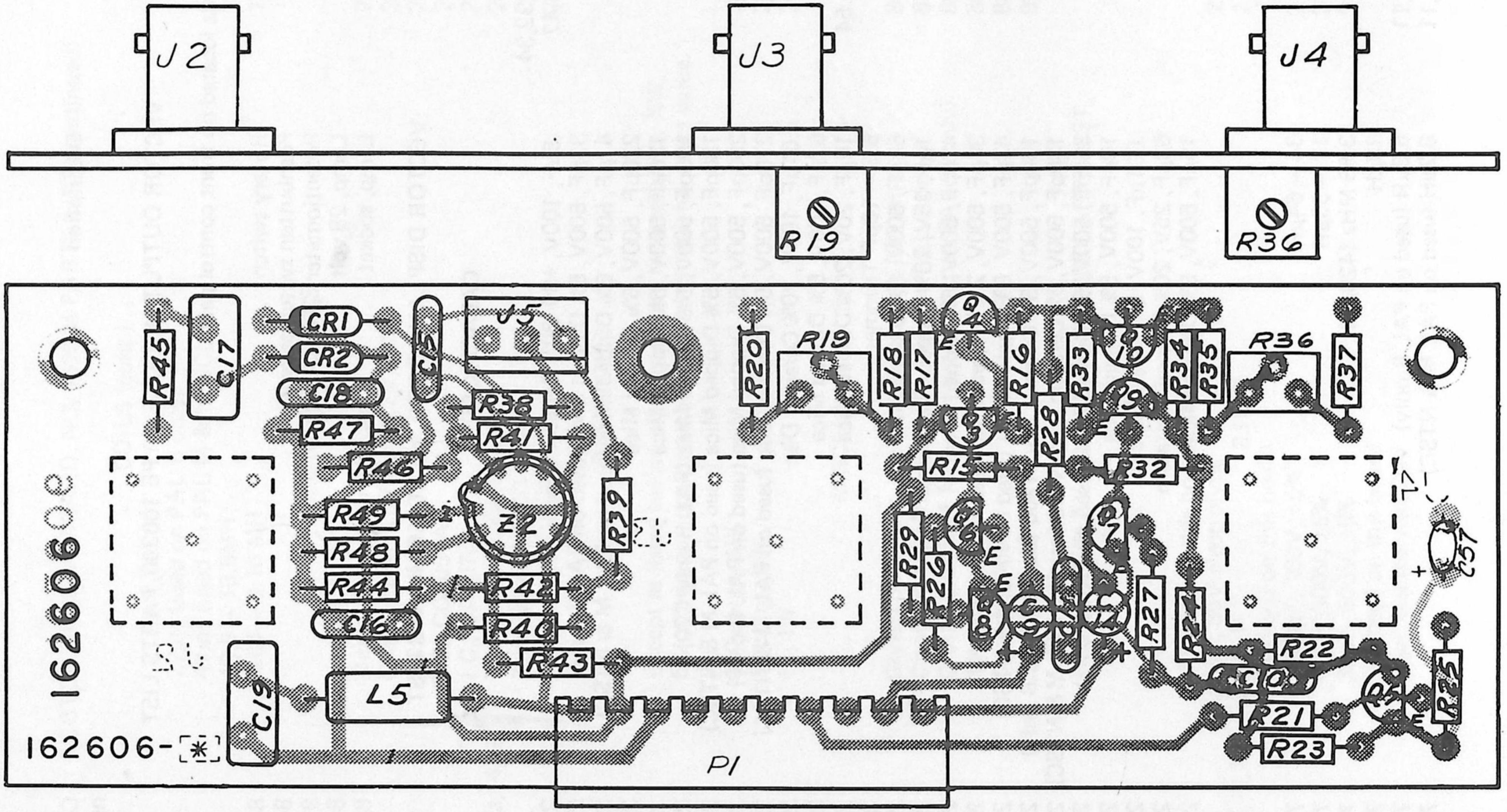
TOLERANCES
UNLESS OTHERWISE SPECIFIED
XX ± .03 ANGULAR ±
XXX ± .010 HOLE SIZES ± .005
BREAK SHARP EDGES & DEBURR HOLES
DO NOT TEMPLATE DRAWING

CONRAC
CONRAC DIVISION
CONRAC CORPORATION
600 NORTH RIMSDALE AVENUE
COVINA, CALIFORNIA 91722

TITLE
SCHEMATIC
VECTOR DISPLAY
MODULE

	NAME	DATE
DRAWN BY	D Lange	10-21-74
CHECKED BY		
APPD. ELEC.		
APPD. MECH.		

SIZE D
DWG. NUMBER 106390


J2
J3
J4
R19
R36
R45
C17
CR1
CR2
C18
C15
J5
R47
R38
R41
R46
R49
R48
R44
C16
Z2
R39
U1
R42
R40
R43
L5
C19
U2
162606
162606-[*]
P1
R20
R19
R18
R17
Q4
E
R16
R33
Q10
R34
R35
R36
R37
Q9
Q3
R28
R15
R32
R29
R26
Q6
Q8
Q5
Q11
Q12
Q7
R27
R24
R22
C10
Q2
R21
R23
R25
C57
L7

Symbol	Description	Conrac Part number

VECTOR OUTPUT MODULE, TYPE 106390, PARTS LIST

Components located on front control panel

Symbol	Description	Conrac Part number
S1	Rotary switch	844170
S2	Pushbutton switch assembly	844177
R1	Potentiometer, 250k	928409
	Lamp, 28 volt	844169
	Lamp, socket	886212

VECTOR DISPLAY BOARD, No. 162604 PARTS LIST

CAPACITORS

Symbol	Description	Conrac Part number
C1,5,6,31,32,34 C37,44,45,47	.5μF, 100V, +80 -20% Ceramic Disc	211041
C2	33pF, 500V, 5% Dipped Mica (used on PAL B only)	210150
C2,3,29	47pF, 500V, 5% Dipped Mica (used on PAL M & NTSC)	210195
C4	220pF, 500V, 5% Dipped Mica	210425
C7,12	120pF, 500V, 5% Dipped Mica	210345
C8,13,20	150pF, 500V, 5% Dipped Mica (PAL B only C20)	210375
C20	180pF, 500V, 5% Dipped Mica (used on PAL M & NTSC)	210405
C21 – C26	200pF, 500V, 5% Dipped Mica (used on PAL B only)	210409
C21 – C26	270pF, 500V, 5% Ceramic Disc (used on PAL M & NTSC)	210480
C27,28	.01μF, 100V, 20% Ceramic Disc	210869
C30	62pF, 500V, 5% Dipped Mica	210240
C33, 51 – 54	10μF, 20V, 20% Dipped Mica	211443
C35,42	5.5 – 18pF Trimmer	211845
C36	68pF, 500V, 5% Dipped Mica	210250
C38	1μF, 35V, 20% Dipped Tantalum	211338
C39,43,46	470pF, 500V, 5% Dipped Mica	210555
C40	36pF, 500V, 2% Dipped Mica (used on PAL B only)	210160
C40	43pF, 500V, 5% Dipped Mica (used on PAL M & NTSC)	210180
C41	150pF, 500V, 5% Ceramic Disc N750 (used on PAL B only)	210373
C41	180pF, 500V, 5% Ceramic Disc N750 (used on PAL M & NTSC)	210401
C43,46	360pF, 500V, 5% Dipped Mica (used on PAL B only)	210515
C48	10pF, 500V, 5% Dipped Mica	210065
C49,50	.001μF, 100V, 5% Dipped Mica	210655
C55	68μF, 25V, 20% Dipped Tantalum	211576-001
C56	15μF, 500V, 5% Dipped Mica	210080

COILS

Symbol	Description	Conrac Part number
L1	34 – 64μH	770136
L2	17 – 33μH	770135
L3,4	3.58 MHz (420μH)	770395
L6	18μH	770425
L7,8,9,10,11	6.8μH (used on PAL B only)	770423
L7,8,9,10,11	8.2μH (used on PAL M & NTSC)	770424

VECTOR DISPLAY BOARD, NO. 162604 PARTS LIST (continued)

COILS (cont.)

Symbol	Description	Conrac Part number
L12	27μH (used on PAL B only)	770426
L12	47μH (used on PAL M & NTSC)	770427
L13	13.5 – 16.5MH	770428
L14	5.04 – 6.16 MH	770429

SEMICONDUCTORS

Symbol	Description	Conrac Part number
CR3 – 15,17	Diode, Si, switching PG912	206106
CR16	Diode, Zener, 1N756A, 8.2V, 5%	206091
Z1	I.C., TAA630	208004
Z3	I.C., CD4051AE	208107
Z4	I.C., CA3070	208003
Q1,2,11,13,14,15,	Transistor, 2N3904	207227
Q12	Transistor, 2N3053	207150-001
Q16	Transistor, 2N3643	207205

RESISTORS

Except as listed below, all resistors are replaceable by ¼W, 5% carbon composition units. See schematic for exact value.

Symbol	Description	Conrac Part number
R69	470 ohms, ½W	201590
R70,88	10 ohms, ½W	201135
R86	1k, 1W	201770

MISCELLANEOUS

Symbol	Description	Conrac Part number
X1	Crystal 3.58 MHz, can type, (used on NTSC only)	844181
X1	Crystal 4.433 MHz, can type, (used on PAL B only)	844067
X1	Crystal 3.575611 MHz, can type, (used on PAL M only)	844095
J1	Connector header	886147-010
J6,7	Connector header	886198-010
XZ1,3,4	Socket I.C. 16 pin	935058

VECTOR DISPLAY BOARD, NO. 162606 PARTS LIST

CAPACITORS

Symbol	Description	Conrac Part number
C1 – C8	Not used on this board.	
C9,14	1μF, 35V electrolytic	211338
C10,11,15,16,18	.01μF	210869
C12,13	Not used on this board	
C17	1000pF, 100V, ±5%	210655
C19	43pF, 500V, ±5%	210180
C19	36pF, 500V, ±5%	210160
C20 – C56	Not used on this board	
C57	10μF electrolytic, 20V	211443

VECTOR DISPLAY BOARD, NO. 162606 PARTS LIST (continued)

RESISTORS

NOTE: Except as listed below, all resistors are replaceable by ¼W ±5% carbon composition units. For exact values, see schematic diagram.

R19, R36	Potentiometer, 500 ohm	928483

SEMICONDUCTORS

CR1,2	Diode, type PG912	206106
Q1,2	Not used on this board	
Q3,5,9	Transistor, NPN, Si, 2N3904	207227
Q4,10	Transistor, PNP, Si, 2N3906	207228
Q6,7,8	Transistor, NPN, Si, 2N4265	207232
Z1	Not used on this board	
Z2	Integrated circuit, RCA type CA3018	208097

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SWATEK

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5500 NTSC

5512, 5522

Alignment Procedure / Performance Specification

Prepared by M. Swatek Date 1-13-75

Checked by Date 1-24-75

Approved by Date 1-27-75

Approved by Date 2-4-75

Rev.	ECO	Description	Checked	Approved	Date
A		NEW SPEC	—	—	2-5-75

THIS ENVELOPE INCLUDES ERRATA AND ADDENDA PERTINENT TO THIS MONITOR

Warranty

CONRAC CORPORATION warrants each new broadcast and industrial product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within one year from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio and television products.

CONRAC
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